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CONTENTS

	Page
Original Papers	
Retinal detachment. Clifford B. Walker	1
Preliminary report on orbital tumors. Guerdan Hardy and William F. Hardy	18
Conical cornea complicated by acute ectasia. George E. Berner	22
Keratitis bullosa. William Thornwall Davis	24
The testing of visual acuity. C. E. Ferree and G. Rand	29
Source of staphylococci on normal conjunctiva of human eye. G. Howard Gowen	36
The mechanism of the cross cylinder. H. Rommel Hildreth	39
Epithelial cyst in the posterior chamber. Charles W. Tooker	41
Sarcoma of choroid in a shrunken globe exhibiting fibrous formation about the tumor. Burton Chance	48
Notes, Cases, Instruments	
An instrument simplifying the insertion of corneo-sclero-conjunctival sutures in operations for cataract. F. H. Verhoeff	53
Society Proceedings	
St. Louis, Colorado, Minnesota	58
Editorials	
Graduate instruction in ophthalmology; Miscellaneous studies in retinal detachment; The cataract incision; University mergers	67
Book Notices	72
Correspondence	74
Abstracts	75
News Items	98

For complete table of contents see advertising page V

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AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 17 JANUARY, 1934 NUMBER 1

RETINAL DETACHMENT

Technical observations and new devices for treatment, with a specially arranged diathermy unit for general ophthalmic service

CLIFFORD B. WALKER, M.D.
LOS ANGELES, CALIFORNIA

The author uses his own diathermy unit and threaded, iridium-hardened platinum micropins having uninsulated stops. The procedure is described in detail, together with one case report in which it was successfully applied. From the Service of Eye Diseases of the Los Angeles County General Hospital, Unit 1, and from the Ophthalmological Department, University of Southern California. Instruments and technic were first exhibited at the January 3, 1933 session of the Los Angeles Eye and Ear Research Study Club.

Since the use of diathermy was first introduced as a means of treatment for separated retina it has gained steadily in importance until it now supersedes all other methods for treating the great majority of cases. Yet, without doubt, the Gonin procedure and the Lindner-Guist methods have definite advantages in special instances or even various combinations of all these technics may serve to produce maximum efficiency as knowledge accumulates. At least to this end it seems advisable to report experiments which may either save time or stimulate the efforts of those interested in these possibilities.

My first interest and experience in the use of electricity for treatment of separated retina dates back over seventeen years, when after being house officer on Dr. F. H. Verhoeff's staff at the Massachusetts Charitable Eye and Ear Infirmary, Boston, I observed some experiments and successful operations for separated retina carried out by Dr. Verhoeff in his laboratory and operating rooms. So far as I can trace in the literature, Dr. Verhoeff[1] was the first to use multiple small ophthalmic needles through the sclera to carry a cauterizing, electrolytic (9 volt, negative-pole direct) current to the choroid or both choroid and retina to stimulate an adhesive choroiditis. Indeed if the war had not intervened diverting effort into other channels, I believe that the relatively painless diathermic currents then used almost exclusively by the urologists would have been tried, in modified form, during the course of ordinary research variations and the present method at least more definitely foreshadowed, if not entirely exploited. The closeness of the approach to the present technic is shown by the fact that an arc of 15 electrolytic punctures was made extending along and behind the equator of the eyeball, embracing the width of the separated area. The chorioretinitis or grey spots produced by the punctures were later seen in the patient's reattached retina with the ophthalmoscope, and such punctures through animal sclera were also examined microscopically. This fundamental work unfortunately was not published in the most widely read journal.

It was not until the latter part of 1926 that I felt convinced that diathermy would justify its expense in ophthalmic practice and installed a portable but efficient diathermy unit ("Acme") in the office for routine treatment. Then I began to use it therapeutically for many ocular and neighboring conditions. In my work, the use of Tesla and Oudin currents in and around the eye was practically stopped in 1928, having been found to be less valuable, more painful, and less precise, due to spark and spatter, than the d'Arsonval or diathermy current. But since separated-retina cases were being

grouped in other hands for ignipuncture I did not attack this problem with diathermy until an abstract of Larsson's[2] work came to hand late in 1930. Not obtaining much success (perhaps because of getting the poorest prospects) but rather severe reactions and some cataract formation with this method, I began, in 1931, to use a pro-

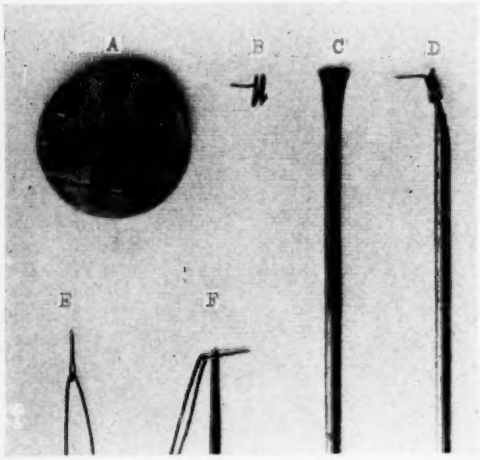

Fig. 1 (Walker). First detachable microtips made from steel beading needles. Carell needles will provide threading eyelet.
(A) Microtips mounted on cork. Assorted sizes.
(B) Formation of single tip. Only the coil is detempered.
(C) Carrier pin is magnetized to facilitate pick-up.
(D) As used. Detaching force is at right angles to point of tip.
(E) Threaded tips made from eyelet end. Easiest and quickest to make.
(F) A glass bead or a tortoise-shell spatula may be used as a depth check when applied to the sclera.

cedure similar to what is now called diathermic micropuncture. It was a modification of Verhoeff's original method. I attempted to make the needles (fig. 1, E and F) much shorter. Long slit-eyed beading needles, such as I had tested before[3] were cut off, sharpened, and the eye expanded to act as a depth stop. Also at first for the same purpose an old tortoise iris repositor was often held against the eyeball and needle. The globe could then be rotated with the needles still in position and they would not be so easily dislodged and bent about. Instead of a strictly preliminary transconjunctival drainage of subretinal fluid, the sclera was exposed as Larsson describes and I tried to get in considerable treatment without softening the eye before trephining for durable drainage. I did not think at this time that micropuncture alone would drain for a sufficiently long time. To treat the choroid without losing tension, I also at this time used a beading needle (fig. 4, D) as if to make a very deep, almost penetrating, Verhoeff or Jameson scleral stitch to the deepest scleral layer, aiming to pass for 2 or 3 mm. practically between the choroid and sclera. This is a very good maneuver since there will be hardly any leakage at all even on accidental perforation, as compared with a straight puncture hole under tension. It can also be used to prepare a bloodless line or right angle to perforate with a cataract knife,

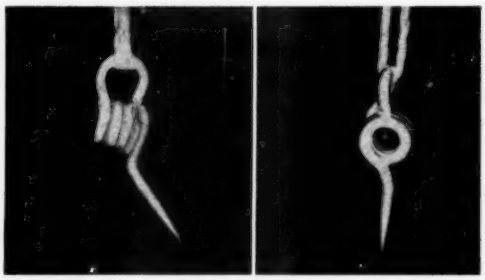

Fig. 2 (Walker). Photomicrograph (profile ×10) of 15-percent iridium-platinum wire tip. Coil (1 mm. outside diameter) is made oval rather than circular to prevent rotation and still detach perfectly from the center-pin carrier. Eyelet is locked in coil. This form in different wire sizes we regard as the best.

or cut a small V-shaped opening. Likewise a small triangle may be outlined preliminary to trephining for prolonged drainage. I have not seen this method described so far. Weve's[4] monograph, for instance, which I later obtained describes only straight micropuncture.

In the first part of 1932 these pins had taken the forms shown in figure 1 and were used on service at the Los Angeles County General Hospital. In Dr. Verhoeff's clinic we used to speak of "tacking" the retina down (though

only regular, undeformed ophthalmic needles were used). I attempted to make very short "tacks." They were magnetized, sharp point negative, to aid handling (fig. 1, A and B). After discarding many devices, I finally held a "beading" needle with about 2 mm. of the sharp end in the jaws of a cold pair of pliers. The rest of the protruding needle shaft was detempered by drawing it through a flame. Then a flat coil (fig. 1, B) was formed with the short-tempered tip protruding at any desired angle. The coil must spring onto carrier (fig. 1, C) but must be detachable with less than six ounces of pull. This steel carrier was magnetized (chisel-tip negative pole) to help in picking the little "tacks" up if they were dropped, which frequently occurred,

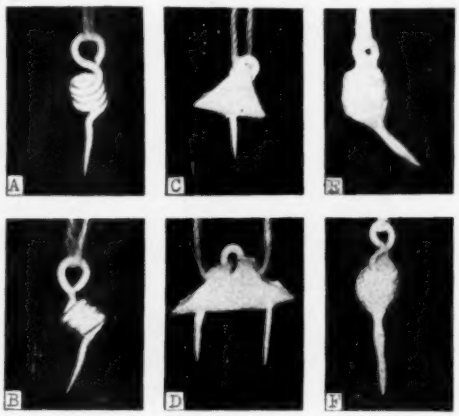

Fig. 3 (Walker). A few of the tip forms tried. (Photomicrograph ×9).

(A) and (B) Eyelet positions which give a long but narrow tip.

(C) and (D) Thread rubber-tubing insulation.

(E) and (F) Bakelite coating insulation down to within 1/3 mm. from tip for limiting treatment to the choroid and avoiding overdose to the sclera.

without threads. In deep portions of the eye, a continuous vaselined thread was passed from pin to pin through the coils as they were inserted. While I did not know of Safar's[5] most excellent work, I had already discarded the use of tiny glass beads, bakelite, rubber, or fiber insulating stop collars, either because of bulk or from fear of dirt or fragmentation in sterilization and repeated use; also because a thin disc does not insulate entirely after it is wet by salt-containing fluids on the sclera, so that its advantages are slight and its menace considerable. In a word, with my almost shoulderless pins I did not find insulation necessary on a fairly dry sclera, then or now, as far as scleral current loss was concerned. The wide-shouldered single or multiple Safar pins, of course, must be insulated. After some use and sterilization, observation of such insulating collars and enamels with the slitlamp will demonstrate at the union of pin and disc, particles and oxides which one would not choose to coagulate into an eye or even to leave below Tenon's capsule. Nor did my ob-

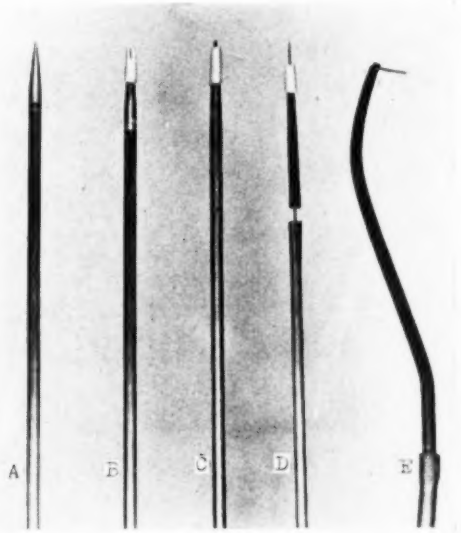

Fig. 4 (Walker). Center pins of length according to type of chuck handle (cf. figure 6).

(A) Center pin formed with oval cross section at the taper to fit oval coil of microtip.

(B) Cuff of thread rubber tubing with slit to receive eyelet of microtip when very close placement of tips in sclera is desired.

(C) Cuff without slit. Used for most of the work.

(D) A secondary chuck to hold an easily replaceable beading needle at any desired length.

(E) With this flexible tip (bakelite coated to the distal 1/3 mm.) it is possible under observation to cauterize the margins of certain retinal tears. This, however, is not advisable or necessary now.

servation, since I have so far been driven to the use of multiple pins, (fig. 9) of the intraocular phenomena indicate any necessity for insulating collars on my pins, so far as treatment was concerned, as will be discussed later. If all parts were, therefore, made of a metal which would hold its hardness without oxidation when put in a Bunsen burner flame, cleaning would be easier.

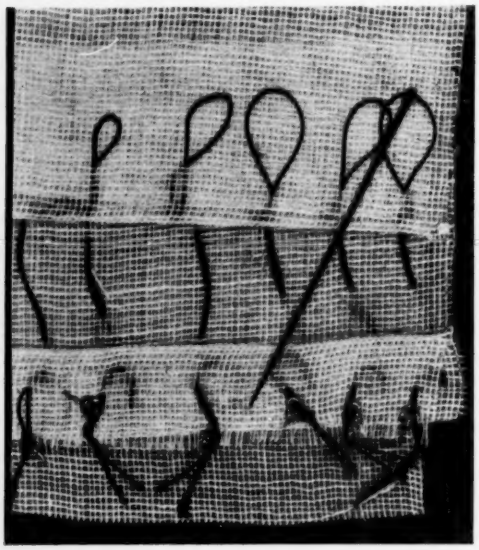

Fig. 5 (Walker). A "self-threading" needle is used to mount the microtips in gauze for either dry or wet sterilization and rapid availability on the instrument table.

By the end of 1932, I had discarded all steel or iron pins and insulating stop collars because of their tendency to rust, get dull, or break off under the vigorous cleaning necessary. They were almost impossible to keep clean enough to pass a slitlamp examination. Then I turned to 15- to 25-percent iridium-platinum wire because it could be thoroughly cleaned without losing its hardness by flaming in a Bunsen burner. Oxidizing difficulties fell away. These microtips were made in various wire diameters, but 0.3 mm. is most commonly used now and up to 0.50 mm. for larger drainage punctures, or inner barrage formation.

Many pin forms and insulations were tried, some of which are shown in figure 3 but the form shown in figure 2 seems to be the best. The coil is now slightly oval to fit without rotation the correspondingly flattened stylus, (fig. 4, A) or center pin of the terminal

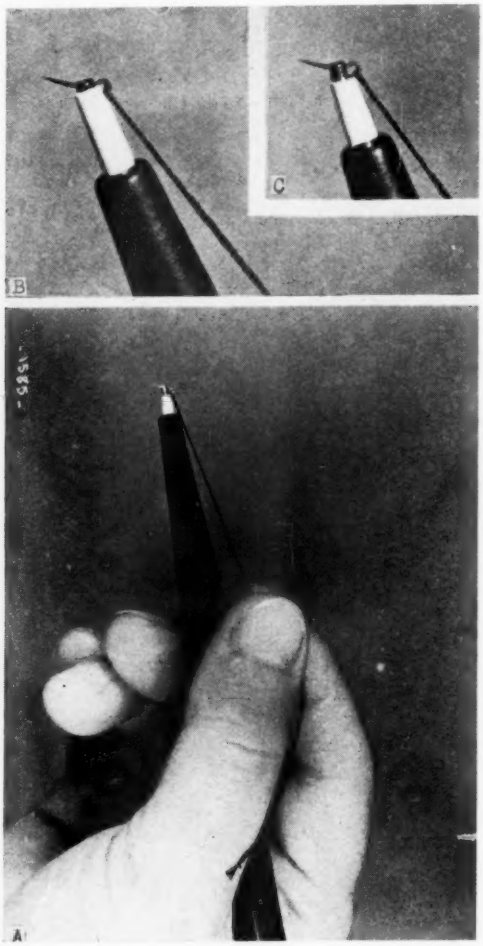

Fig. 6 (Walker). (A) Showing method of holding microtip thread and handle with finger-tip release control. The insulated (bakelite, boilable) handle does not demand the use of rubber gloves.

(B) Microtip used with rubber cover with oval coil and center-pin needle at right angle to shaft. Eyelet in slit. Any degree of rubber covering over the coil may be used.

(C) Without cover. The micropoint may be placed at any angle. The microtips also may be reversed so that they can be used for deep work without bending the needles.

bakelite handle (fig. 6) which is boilable or may be sterilized with dry heat, autoclave, or alcohol. The micropoint is set almost at right angles to the coil for

most of the work, but may be quickly bent to any other desired angles, even pointing forty-five degrees backward. Sterilizing solutions containing electrolytic salts are avoided and after any wet sterilization all parts must be thoroughly dried. Each tip has an eyelet for threading either individually or consecutively on alboline (insulating) thread (or on wire to be cleaned in Bunsen flame, or even acid).

In figure 4 (B) is also shown the use of "thread" rubber tubing on the center

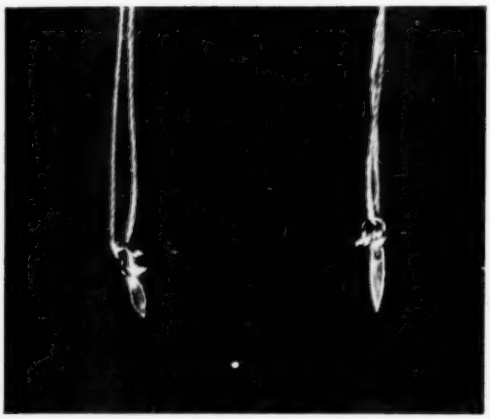

Fig. 7 (Walker). Quill-shaped tips with coil attached at an angle to shaft with edges visible to operator. The materials for the shaft are at least 15-percent iridium-platinum, including the solder. The edges are sharpened and the tube of the quill is filled with platinum solder for stopper action. This tip may be burned clean in the flame, like all the other platinum tips. This quill will cut a semicircular hole and plug it almost as quickly as a micropin when more and longer drainage is desired.

pin to extend the insulation. This, as is shown in (C) may be slit to receive the threaded eyelet and cover the coil for better insulation, as is shown in figure 6 (C). For the usual conditions, the insulation of the coil of the microtip, which is only about 1 mm. outside diameter, has been unnecessary if one is careful not to touch metal parts in the field, or better still, if, after the "Control" is set (at about 35) by test on the sclera to deliver to the micropin the desired current, e.g., 25 to 50 Ma., the meter is switched to "HIGH" to avoid burning out the fuse protecting the meter, which is the only harm done either to sclera or instrument, in case of accidental short contacts.

Figure 4 (E) shows a semiflexible tip with the wire tip coated with bakelite to within ⅓ mm. of the end. With this under ophthalmoscopic observa-

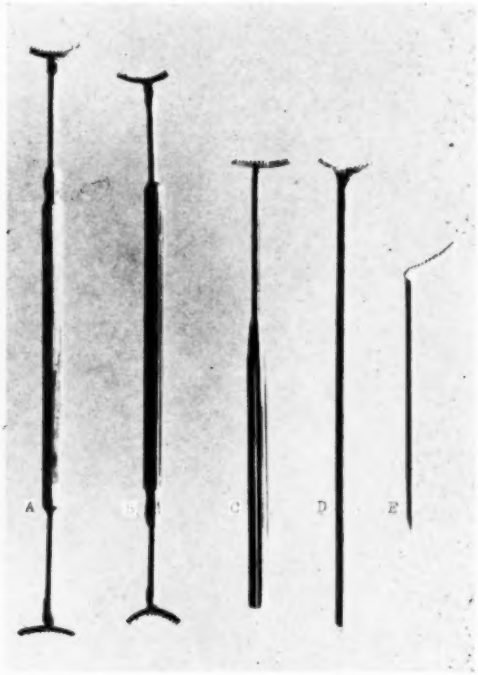

Fig. 8 (Walker). Scleral rulers to measure from limbus to equator (13 mm.) and along equator to meridian or to tear. The millimeter teeth fit the scleral curve and have just enough spur against the sclera to prevent slipping.

(A) is curved on the flat at one end and on the edge at the other end. This is the most useful combination.

(B), (C), (D), and (E) are other forms and sizes—the earlier patterns.

tion, it is possible, through a small puncture, to cauterize the edges of the accessible retinal tears. This procedure is not out of the experimental stage as yet, and is not only unnecessary, but really inadvisable. However, a similar but more heavily coated needle with a barbed tip may be used to engage, coagulate, and draw up a dislocated lens in the vitreous or anterior chamber. A cataract may also be removed either by bipolar method or with bipolar dou-

ble insulator needles or barbs. This requires a current perhaps up to 200 Ma. and requires considerable skill to avoid heat injury to iris, vitreous, or cornea. The insulating enamel must be perfect and reliable, even on bending. A bipolar needle for cataract work has advantages but much technical improvement has yet to be accomplished before other common methods are displaced.

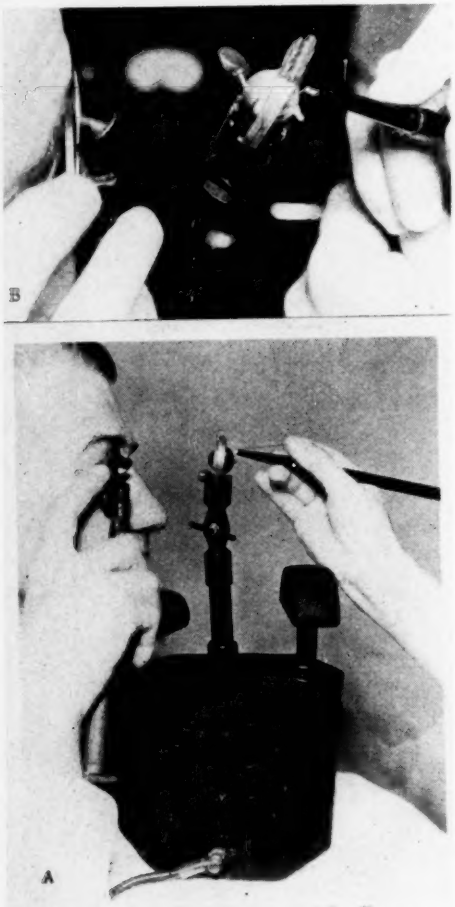

Fig. 9 (Walker). An arrangement made up to study and demonstrate the action of the treatment within the eye and upon the sclera with various devices. Freshly enucleated cat or dog eyes from the pound were found to be very suitable because of wide pupil and transilluminability of the sclera at the spot being observed, the ophthalmoscope light serving a double purpose.
(A) Shows the general arrangement and
(B) Shows a close-up of the mechanism holding the eye in firm position by clamping the recti muscles in a double ring which acts as the indifferent electrode.

Without digressing further from the subject of separated retina, I may state that the mounting of the micropuncture tips, both of fine size and of large or conical tip size, and also of quill tips (fig. 7) may be by individual knotted thread drawn into gauze (as we often prepare other needles and thread) by use of an ordinary self-threading needle.* In this case, the microtip is allowed to run down to the knot and is sewed in the gauze in the ordinary manner with a self-threading needle which is then detached leaving such an appearance as is shown in figure 5. This gauze can be sterilized either dry or wet, but the threads must be always thoroughly dried, of course, before they are used in the micropuncture operation. Otherwise they will lead off some of the current from the tip. There are other ways in which the pins may be mounted. For instance, I have lined up ten or more threaded micropins in a cork-matrix slab with an additional continuous oiled thread running through each eyelet. After the micropins are transferred to sclera, individual threads are cut away leaving the micropins all anchored or strung on a single oiled thread. This will be detailed later.

In removing these threaded microtips from the gauze in order to attach to stylus and handle, I find that it is easiest to hold the handle loosely as if it were a pencil at rest in the fingers. The fingers of the same hand are then free to pick up the knotted end of the thread and draw it out of the gauze. The thread is then drawn between the first-finger tip and thumb of the opposite hand until the microtip is held with proximal end of the coil presenting, with the eyelet downward and the needle upward and distal. Then the knotted end of the thread is released and the hand holding the handle is rotated until the little finger is upward as

* For operators who do not like to use the individual thread to hold the micropin on the stylus, a forceps is made, one arm of which ends like the stylus, the other arm fitting the outside of the coil. This fits into the handle and may be used much faster by some operators. With this forceps, of course even the running thread may be discarded by platinum-blacking the pins to make loss more difficult.

the stylus is entered into the coil. When the hand is rotated back to the normal position, the thread is at the same time drawn around (by the fingers which previously held the microtip coil) and placed against the thumb and first finger of the handle hand, holding the needle in such a way that the first finger may be used to hold it in complete control of tension. Then by first releasing this one finger the microtip is left in place as the handle draws the stylus out of the coil of the pin, after the latter is held in the scleral coagulation (fig. 6). This coagulation holds the smaller micropin with a tenacity requiring often a six-ounce pull (by actual measurement) to release it. The control of the needle is very satisfactory and its disengagement is instantaneous with the thread in position to prevent loss either in or out of the eye. However, if one chooses, the thread may be separately held instead of the work all being done with one hand. There should be no difficulty in keeping the thread dry and with a little care one avoids touching the microtip to any metal retractors about the eye. But even in this case no harm will be done other than to blow out the fuse protecting the milliammeter. As an added precaution one can throw the meter either to "HIGH"* or "OUT" after having once obtained the control setting necessary to penetrate the sclera smoothly with no sparking. This control setting will, for micropuncture, usually average around 25 to 40. One soon, without looking at the meter, learns the "feel" of a smoothly operating needle current (25 to 50 Ma.) as it penetrates the tissue, just as one learns the "feel" of a sharp cataract knife. The current is not used by foot switch until the needle is pressed a little into the sclera. This pressure is maintained perpendicularly on the pin as the current aids penetration.

In addition to the methods of obtaining the large drainage opening already described, there remains the possibility of using a tiny Bouvie loop and high-frequency cutting current. This I have tried, and while it is possible to make a trephine opening this way, the expense and weight of the instrument are doubled or trebled on account of the additional unit for the true cutting current and the opening obtained is not superior and is more difficult to control than with the cutting quill shown in figure 7 used with the low-frequency diathermy current. This quill is made of 25-percent iridium-platinum tubing, 35/1000 of an inch or about 7/8 mm. in diameter which corresponds to B and S gauge No. 20 needle. The quill on this tip has a length of about 2 mm. and the edge is sharpened both inside and out. Back of the quill enough of the tubing is left to solder it with platinum to a microtip coil so that it fits the regular stylus and handle. The tubular portion of the quill is filled with platinum solder so that when it is used with the diathermy current it cuts a semicircular opening and then plugs it as the solid portion of the tubing reaches the opening, and pushes the retracting scleral tongue back. There may be a minute bit of leakage while this quill is in transit through the sclera, but often five or six can be used, if it be deemed necessary, before the eye softens. Since the current is more intense at sharp points or edges, the cutting effect of this device with a given current is much greater than a conical tip would require to make the same opening, and the damage to the sclera is correspondingly diminished because it requires very little current, sometimes not much more than the microtip. Personally, I avoid putting large drainage openings immediately over the tear, because I feel that vitreous loss from herniation through the tear should be combated, since it tends to reduce the supporting structure of the retina and still further exaggerates the vitreous traction which may have brought on the original trouble. Therefore, it seems more reasonable to drain the subretinal fluid from around the tear, and to try to avoid the chance of losing any vitreous of good structure which may have herniated through the tear. This trephine quill compared with a trephine, inhibits the tendency to bleed because of

* By means of a spring on the switch it can be made to turn back to "HIGH" as soon as a "LOW" test is made. In this way no trouble of any sort, either to patient or instrument occurs if accidental touching of metal occurs.

coagulation. It gives a durable opening and it has the same advantage as regards cleaning as the other platinum microtips, in that it may be flamed in the Bunsen burner, since the platinum solder will not melt unless it is subjected to blow-torch temperature. The tear area itself is treated rapidly with a surrounding cluster of fine micropins or with the beading needle "slanting" between choroid and sclera.

So far I have not had great occasion to use the Safar "needle brush" although it is easy to fit into the handle of the machine herein described. I prefer to use single points of known dosage, since one cannot be positive of the dose delivered to each point of the "needle brush," for this will vary according to the condition of each of its micropoints as regards sharpness, diameter, and the amount of accumulation at the base of the points. These can be scraped and laboriously cleaned, but still I know that in doing this not all sides of the pins are clean, as a rule. I have found that Safar multiple tips are difficult to clean without dulling or shortening or altering the size by scraping. They cannot be cleaned by flaming. Each pin when set in the sclera may stick with a force of six ounces so that the total pull in removing may rise as high as two pounds unless they are carefully pried out or unless the current is used to help them out which at the same time has a tendency to narrow the opening again. I do not like to use the 150-300 milliamperes of current that are required, on the inside of the eye, because of the possibility of some slight macular damage, since the current tends to concentrate at the posterior pole of the eye, due to the course of vessels and nerves toward the macula and disc. Against these disadvantages, it may be said that as regards the "last move" the "needle brush" is faster working and possibly it can be used at a greater depth, though the moisture and serum at a very great depth are a great handicap. I have had little difficulty in making my single micropunctures 8 or 10 mm. behind the equator either with or without rubber covering and even in the presence of considerable serum moisture.

Using the needle brush at a considerable depth, if the sclera is wet or if the pins get slightly bent towards each other or dulled, even with a current strength of 200 Ma. the six-point brush may act practically as a flat electrode and only coagulate the sclera severely in the manner of the Larsson treatment. All things considered, I have felt the safest, using single points that can be made to work even at the macular depth by using a little longer curved rubber-covered center pin.

In one successful treatment four dozen micropins were used in order to encircle three different tears 30 to 60 degrees apart, requiring 120 degrees of barrage work. When a large number of threaded microtips is to be used it is worth while to reduce the number of threads in one of the following manners. A beading needle, threaded with eighteen inches of ordinary fine surgical white silk thread, saturated with alboline to insulate it against moisture, is prepared and laid in readiness on the sterile head coverings. The end of this thread is tied to a glass bead or to a large microtip which will give a firm anchorage when coagulated in the sclera. Then, when each microtip is mounted on the stylus ready to insert in the sclera, the beading needle is passed through the microtip eyelet and the alboline thread is drawn through and looped loosely back up on the forehead. The microtip is then coagulated into the sclera and its short holding thread cut and removed. This is repeated until a satisfactory number of pins (8 to 18) have been strung on the oiled thread, which can at the same time be drawn up until simply one thread runs from pin to pin. The pins finally are removed consecutively and handed to the nurse who cleans the string in water. After this cleaning, the string of pins is transferred to a fine platinum wire and passed through a Bunsen flame, burning off all carbonaceous matter, and the bright clean pins are ready for remounting.

Another, still better way is to prepare the following running-thread arrangement before the operation. A slab of matrix cork 1¼" x 2½" and about ¼" in thickness is covered with muslin held in place by 5 or 6 short pins. Tabs are left at both ends for pinning to the head drapes over the affected eye, during transfer of the micropins to the sclera. Close to one end of this cork slab, micropins (12 in number) are inserted so that their eyelets are in a straight row and their individual threads extend to the other end of the cork slab where they are caught in 12 cuts in the upper edge of the slab. The eyelets now being in a straight row are easily strung by passing the beading needle through them all at once carrying a white silk thread about 8" long, and this is finally left with a bead tied at both ends. The micropins are then transferred in order to the

eyeball and no snarling of threads occurs. The black threads are removed, either all at once or singly, as the pins are placed in position. This process is very simple because the stylus is entered into the pin coil as it stands in the block after the individual thread has been lifted out of the slit in the cork at the other end. When the nurse has prepared these blocks, they are placed in a little cellophane bag (3" x 4") which is folded over and over and held with a rubber band. This package is placed in another cellophane bag for sterilization by dry heat (from 275° to 300°) for an hour. Cellophane is not necessary but it renders the contents visible at all times without necessitating the opening of the package. When steam or autoclave sterilization is used, cloth or paper wrappers are better. Gauze or cloth wrapping may be used if the blocks must be boiled, and, further, the threads must be thoroughly dried again before using.

In order to study more easily the action of the current within the eye under ophthalmoscopic observation, the device shown in figure 9 was constructed. One of the points which is so easily demonstrated with this device, for example, is that when the pin penetrates the sclera and begins to affect the inner ocular lining, the action about the pin point is not altered when the coil of the microtip touches the sclera, at which time more current runs off on the sclera, the microtip still displaying by ophthalmoscopic appearance, the same amount of treatment as before. For instance, if the meter needle jumps from 50 to 90, it is only the sclera that is being affected with extra 40 Ma. and that not very much, as we already know from Larsson's work that 150 or 200 Ma. are required for a few seconds really to coagulate the sclera with a blunt tip. Nor is this slight scleral effect without its benefits. In moderate amount it is a valuable addition to the treatment.

If the coil momentarily strikes another pin accidentally, no visible change of dose results, since again for the fraction of a second both pins receive almost the same current. Two pins are able to draw almost twice as much current. The only difficulty, therefore, is with the meter fuse and as before suggested, this is easily handled by switching to the high meter when the current is set for correct perforation of the microtip, or by using a spring on the switch which automatically throws it back to "HIGH" unless it is held on "LOW" for test readings. Also, of course, the rubber insulation of the stylus may be used by taking a little more time.

Other phenomena are readily studied with this apparatus. One sees the formation of the bubble vacuole in the neighborhood of the pin and occasional pigment wandering. The content of these bubbles is to some extent water vapor and coagulative by-products which occasionally may be seen to shrink as the current is turned off, permitting cooling. Otherwise, they reabsorb an hour or two later, when produced in the anesthesized living animal eye. A large dog's eye has a size and scleral thickness similar to that of the human eye so that practically all the phenomena accompanying current variation may be studied. For routine demonstration purposes and testing, these eyes may be obtained immediately after the animals have been gassed in the city pound. They will maintain their transparency for about six hours. However, the pupil is not quite so dilated under these circumstances nor is localization of the area under observation on the posterior sclera by ophthalmoscopic transillumination as easy as it is when using cat eyes. In the cat's eye one finds a very wide pupil, under these conditions, and the light from the observer's ophthalmoscope transilluminates the posterior sclera just at the spot where observation is being maintained, so that treatment may be placed precisely in the field of observation, and all stages of coagulation with various currents are thus easily followed After many trials with various sorts of obtainable eyes, the cat's eye was found to be the best for demonstration purposes.

At first the eyes were simply laid on a suitably shaped brass cup, which was fixed at the end of a pipe. They were held in place by the weight of the hemostats attached to muscle, nerve, or conjunctiva. But as the requirements became more definite, a hinged metal ring made of brass washers (to fit the diameter of these eyes—about 20 mm.) was used to clamp all the recti muscles, so as to give a large area of indifferent electrode. The current passed through the supporting gas-pipe post. This post is hinged so as to permit new areas of sclera to be brought into line without too much change in position of the observer's head. The washers may also be rotated almost 300 degrees so that practically all of the posterior sclera may be brought into easy view for a large number of demonstrations. Adjustable head rests are provided for better coordination, both of observer and operator, and yet if they seem to be in the way, in certain positions, they are immediately removable. Here, as in the operation, when one is using the "LOW" meter he must cultivate care and avoid touching any metal parts with the microtip electrode while the current is flowing. It is obvious that this is a very satisfactory eye holder for study of many other conditions and operations, because it is easy to maintain the eyeball at a normal ten-

sion, which is not the case when one grasps the optic nerve or a muscle by a hook or forceps and draws it into a ring, raising the tension above normal by the time the eye is sufficiently immobilized. On the other hand, if the eye grows too soft, tension is brought up by an accessory spring-clip pressure device applied to a part of the sclera already used. Another way I have found to increase the tension and at the same time make the fundus visible over all the posterior field is having a strong light behind the observer, to press the cornea flat with a wet microscope slide. The ophthalmoscopic enlargement is absent but the field of view is very large. This arrangement also freely exposes the cornea so that the action of the microtip, throughout its course and after penetration, may be observed in corneal tissue under magnification with the loupe or slitlamp.

While this experimentation was being carried forward, various types of diathermic machines were tried. Characteristics necessary for this work soon became obvious; that is, diathermic currents with a frequency of from 500,000 to 750,000. Higher frequencies spark and spatter too much and have more desiccating characteristics which increase resistance, eburnate, and reduce penetration. Lower frequencies harden the surface with low heat and do not penetrate because of lack of enough coagulating intensity, i.e., the heat dissipates too rapidly.

A small compact machine (fig. 10) weighing twenty-five pounds was finally devised with proper characteristics by collaboration of the E. J. Rose Manufacturing Company* (727 Gage St., Los Angeles). A feature of this machine is that the spark gaps are not adjusted to obtain current control, but are fixed in one position, constantly giving the same spark; and current control is obtained by use of a choke rheostat which is able to regulate the delivered current with the greatest smoothness from zero to full capacity. A foot switch is interposed in the *main line* before it goes to the primary coils, in order to obtain more freedom of hand motion and delicacy of touch, and further to avoid heating and current consumption, if the apparatus is left connected to the main line. One knows when the current is produced, either by looking at the pilot lamp or by hearing the spark gaps even though the meter be switched out. The meter, which is of very delicate thermocouple type, is provided with two scales having a ratio of 1 to 4. The high scale goes up to 1000 Ma., and this part of the meter is not damaged by short circuiting on low-control arrangement and is used most of the time because 50 to 150 Ma. is also readable on this scale. It can be used even for pad diathermy treatments to both eyes, using about 800 to 900 Ma. according to size of the pad, and for many other treatments also. The low scale, being only valuable for indicating the lowest milliamperages, is epecially accurate from 25 to 200 Ma. The "LOW" meter must be protected by a 1/4-ampere tungsten filament fuse.** After obtaining the proper amperage at the microtip (about 25 to 50 Ma.) I prefer to switch the meter to "High" where anything over 50 Ma. will register, so that overdraft of the current will be indicated; yet one avoids blowing out a fuse by accidentally touching any of the larger metal instruments in the field of operation. It is hardly worth while to insulate all of these instruments, because touching them with an active electrode does no harm, since the current is extremely low, as far as patient or the machine is concerned, and yet it is enough to require the inconvenience of changing the fuse unless the meter has been switched to "HIGH." In short, it has been found convenient and advisable to use the "LOW" meter only for checking up the current and the "HIGH" meter throughout other periods of the operation. This can also be done automatically by use of a spring on the switch.

It is impossible to connect the line (110 volts alternating) terminals or the foot switch to any except their proper places because of the difference in their fittings. Either foot or hand switch may be used as desired. In hooking up to the patient, either treatment terminal may be used for the cord to the indifferent or large-area electrode is laid

* This company does not make the platinum tip, scleral ruler, eye model, or localizer, all of which are made by the U. S. Optical Co., 671 South Anderson St., Los Angeles.

** Tungsten Fuse Co., 1772 Wilson St., Chicago, and E. J. Rose Mfg. Co., Los Angeles.

against the skin under the patient's shoulder, The other treatment terminal is used for cord connection to the bakelite handle. Two or more of these handles may be used on the same pole if one wants to avoid changing the needle carriers. To test the fuse and low meter it is very easy to dip about ½ inch of the cord tips of both terminals into a medicine glass of normal salt solution carefully avoiding accidentally contacting them with each other when the current is on. Set the control dial to read 35 to 40. The terminals should be held about an inch apart, then pressing the footswitch, a movement of the needle to read a little under 50 Ma. (perhaps over 100 if the terminals get closer or if more tip area is inserted into solution) will indicate fuse and "LOW" meter are functioning properly. Another way to test both "LOW" and "HIGH" meter, which is not quite such a close imitation of the actual settings used in operative work, is done by *first setting the control dial back to zero,* and then directly shortening or contacting the treatment terminal cord tips, while the meter is on "HIGH." A meter reading of about 100 is obtained, due to cord capacity. Throw the switch to "LOW" and with no other change, a cord capacity of about 50 is obtained if the fuse is in good order. Now the slightest movement of the dial will give "LOW" dial readings of 150 to 200 Ma. Any more will probably blow the fuse. When the meter is now turned back to "HIGH" the reading will be almost doubled because the resistance of the fuse is absent and the resistance of the cord has less relative influence.

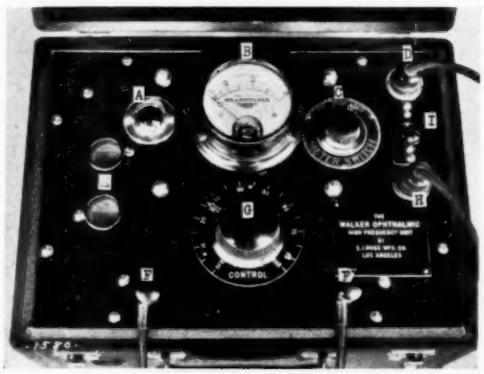

Fig. 10 (Walker). Switchboard arrangement of the Ophthalmic Unit.

(A) Pilot lamp indicates by sight whenever current is flowing.

(B) Delicate meter protected by fuse and giving readings on high or low scale from 0 to 1000 or 250 Ma. according to position of switch (C).

(C) Meter switch when on "LOW" scale permits reliable readings down to 10 or 20 Ma. Twenty-five to 50 Ma. or even 150 Ma. are commonly used on microtips according to diameter. Multiple tips take "High" meter up to 200 or over occasionally.

(D) Main line. Cannot be plugged into any other position on the panel.

(E) Fixed spark gaps. These give a buzz when the current is on so that it is known to the operator even if he cannot look at the pilot light.

(F) and (F') Interchangeable terminals to patient.

(G) Control rheostat. For microcoagulation, when set on 40, it delivers about 40 Ma. to the needle tip when it is 1 to 1½ mm. deep. It is not a bad plan to have a spring to prevent the meter switch from remaining on "LOW" after setting has been made for proper current on sclera. Then it will snap back to "HIGH" and save much trouble from burned fuses.

(H) Foot switch. Cannot be plugged in any other position.

(I) Hand switch. Will do the same work as the foot switch, if desired.

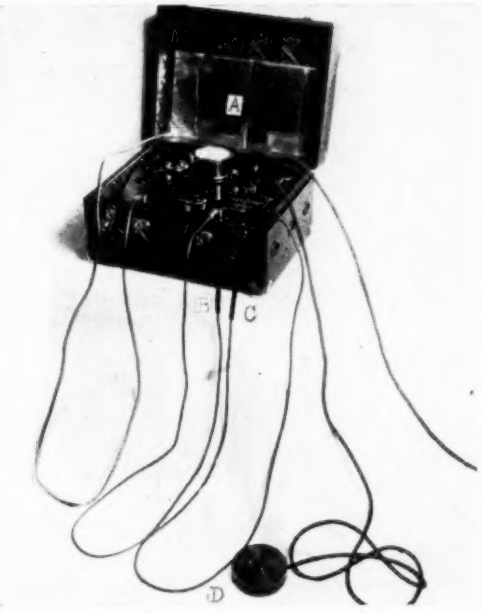

Fig. 11 (Walker). Complete outfit with: (A) Indifferent electrode; (B) and (C) Two handles for rapid work; and (D) Foot switch which works from pressure at any point on its circumference.

With regard to localization and technical procedures, it is a great relief to feel that one does not have to be quite so precise in locating tears as was previously thought. Yet I believe the tear must be localized as definitely as possible and given special consideration in the treatment. I have found a slit ophthalmoscope (Friedenwald, with the mirror properly tilted) of great aid

in obtaining the first approximation of the meridian of the tear before operation, a fountain pen or skin pencil being used to dot the streak where it crosses the orbital rim. The perimeter is used to check this axis as definitely as possible, together (by means of eccentric fixation) with the degrees of field from the macula. A 25-percent reduction is applied to that part of this total angle added by moving the ophthalmoscope away from the perimeter center (cf. Cowan[6]). Then using 3.75 to 3.1 degrees of field according to the size of the eyeball up to—18.00 D.S. as equal to 1 mm. on the sclera along a meridian, we are in a position to localize the tear as regards distance in millimeters from the equator, which may be roughly taken to represent 71 to 72 degrees of field circle if the ora serrata represents 90 degrees. These measurements are then also checked by using the 500-mm. tangent screen method. Here again the Friedenwald ophthalmoscope is used by fitting my crossbar localizing attachment a little longer than the width of the observer's head into the slot designed to hold the telescope on the back of the ophthalmoscope head. The arms of the crossbar are exactly equal. Two strings of equal length (about 600 mm.) are attached to the ends of the crossbar and knotted together at the other end after passing through a loose-fitting short glass tube. This gives a triangular pointer of variable length with which one's assistant can accurately extend the line of observation back to the 500-mm. or 1000 mm. tangent screen. But at the operation all these data are checked by using the scleral ruler (fig. 8) and micropins in the following manner: First the horizontal, vertical, and tear meridians, as obtained by slit ophthalmoscope, are dotted at the limbus by boring a little with a hypodermic needle dipped in gentian violet or other tissue stain, or by sparking a dot with a microtip. After the sclera is exposed by a conjunctival incision along the ora serrata in the desired area, a canthotomy may be performed, and recti muscles neighboring the tear area may be either drawn aside by ligature slings only, or, in addition, a rectus-muscle tendon is divided, if necessary, after marking the point where it is apparently traversed by the horizontal or vertical meridian.

At this stage I may use the scleral ruler and micropuncture pins to check localization in the following manner, which is perhaps my own variation in that I use it to measure along the great circles of the eye not only from limbus or ora serrata to the equator but also along the equator at right angles to the meridian. Let us say, for instance, that the tear is noted to be on the 15-degree meridian on the temporal side of the vertical line above, and is estimated to be 2 mm. behind the equator. The scleral ruler, having a total length of 13 mm. (distance of limbus to equator) and a sharpness of teeth which will prevent it from slipping on the sclera, is laid along the vertical meridian (passing between the middle and the internal third of the superior rectus stump as marked before cutting) to reach the equator and a micropin, threaded in white, is inserted at this point. This is our first marker in the separated area. Also a spark dot with the stylus can be used though it grows fainter later, and an ink mark may spread out too much. The scleral ruler is now used to measure off* (15 ÷ 4.75) 3.15 mm. along the equator to the temporal side, at right angles to the vertical meridian already established, reaching the 15-degree meridian. Now it is only necessary to put another threaded tracer micropin at this point and measure along this meridian two millimeters behind the equator, at which point a third micropin is inserted, which, if time permits and it is deemed necessary, may be observed with the ophthalmoscope in or near the tear, if the retina is not elevated too much. Of

* The following values have been found quite practical: 90 degrees of field along the scleral equator = 18.85 mm. (taking the scleral diameter of 24 mm.), or 1 mm. = 4.75 degrees and decreases about .06 degree for every diopter of myopia; but 90 degrees of field along a scleral meridian from macula to ora serrata = 23.85 mm., or 1 mm. = 3.76 degrees, yet decreasing in myopia to 3.1 degrees at about —18 D.S. and increasing in hypermetropia to 4 degrees at about +6.00 D.S.

course, in myopic eyes it is also necessary to calculate the position of the landmarks for each case, especially as regards the equatorial measurements, on the basis that every 3 diopters of myopia indicate an increase of 1 mm. in the axial diameter. But in large bullous separations, which carry the tear toward the center of the eye, a still more difficult problem is presented. The tear may be seen to chart only 30 or 40 degrees from the macula, yet if one constructs a scale diagram of elevations from the sclera it may become obvious that the tear must have originated from the 50- or 60-degree region, and then with the ora serrata as a center it swung toward the midline until it rested just about as far from the wall of the eye as from the ora serrata. Thus a full 20 degrees would have to be added to the apparent distance from the macula. A scale drawing of a section through the tear meridian is very helpful, but rest in bed or even a preliminary posterior-sclerotomy drawing of subretinal fluid may bring the tear closer to its choroidal origin for a better localization, as well as render a previously hidden tear visible.*

It is notable, with regard to the scleral ruler, that 2 and 3 mm. seem to be so frequently used that they are so arranged on one end of the ruler as to be easily available, while 8 mm., equal to the distance from limbus to ora serrata, are in regular sequence. The trenches of the teeth represent ½ mm. divisions. The points of the teeth are the even millimeters. On account of the great difficulty of accurately sewing a corneal protractor in place, the above method is used in the majority of cases and saves much time at the operation.

Up to this stage it is easy to protect the cornea sufficiently so that with an electric ophthalmoscope (previously made ready with handle in a sterile towel) one may observe just how accurately the tracer micropin is placed in relation to the tear unless the tear is too far from the wall. If difficult to see, a longer pin (fig. 4E) may be used or the pin may be made to flash by contacting a ("thread," rubber-covered, fine, flexible) wire extension from the eyelet to the stylus. Further correction may be made by use of another pin but since making the manikin phantom I have not used this laborious method. So far, all the pins have been on white thread, serving a double purpose, one for treatment and the other for localization. A barrage (often two dozen or more 2 or 3 mm. apart) of black-threaded micropins is now set extending from the ora serrata around the tear, 2 to 4 mm. behind it and then back to the ora serrata again, thus secluding the tear area. In using fine micropins it is usually well to put in a double-row staggered barrage and an especially thick (2 mm. apart) cluster of pins behind the tear.

At this stage our procedure varies a great deal according to our experience and according to the character of the case. The real question is concerning sufficient drainage of subretinal fluid, without, it seems to me, allowing any more drainage than is possible immediately over the tear where good vitreous is liable to be obtainable. For instance, I would not put a large pyramidal microtip or a quill tip or a trephine directly over the tear. These devices should be scattered in a minor barrage around the tear, but inside the outer barrage already described, until one feels sure that sufficient drainage has been provided. On the other hand, if ignipuncture is combined with the operation, as can successfully be done, then I believe in putting a fine (1/2-mm.) white-hot electro-cautery with a very steady hand directly and quickly into the tear and *slowly* out again without loss of white heat if possible because thereby the vitreous plug in the tear is so cauterized that it is condensed and does not have a tendency to herniate in globular form, notable in similar large drainage openings by other methods. Only thin, slightly yellowish subretinal fluid without much stringy tendency comes from the favorable procedures. A preliminary pathway for the ignipuncture is prepared by three fine micropin punctures forming a bloodless line over the tear through which a cataract

* I have constructed a cheap manikin eye with a phantom cellophane retinal section that can be elevated to duplicate condition quickly in each case. Made by the U. S. Optical Co., 671 S. Anderson St., Los Angeles.

knife first is entered to reduce the work of the white-hot point. However, the addition of the ignipuncture procedure almost doubles the necessary equipment and is not without certain disagreeable sequellae, even though these may be greatly reduced by the action of the encircling barrage.

If the ignipuncture is not added, as it has not been lately, then after both barrages of fine and heavy pins are set, the area over the tear is further treated either with a cluster of fine pins, or, quicker and better, with beading-needle, slanting micropunctures aimed to pass between choroid and sclera following the pattern of the tear. Finally the duration of the drainage is further aided by the use of the quill tip placed at the two to four locations in or near the inner barrage. This gives a bloodless drainage, smaller than an ignipuncture or trephine in size, but larger than a low-amperage, conical or pyramidal pin-puncture. With this quill one may proceed more deliberately and as each one is inserted, the tiny leakage gives one a definite idea of what drainage may be expected at that point; especially if it is in a pocket region of clear subretinal fluid will it give the proper clue, and still close the opening, if it is desirable to make more similar openings on other sides of the tear. It is used only for bullous elevations.

At this time, I will only have space for one case report which may be of interest chiefly because quantitative fields were taken before the operation and within the first month after the operation, and because a large tear seemed to justify the use of all the procedures described above.

Case Report: Mr. W. H. T., aged 71 years, was referred by Dr. J. W. Avery of Hollywood, who had noted six months previously a hemorrhage in the right eye which entirely obscured the fundus view at that time. This blood was entirely reabsorbed and the vision returned to 20/20 with a good field within three months. But on March 7, 1933, the patient noticed a veillike cloud appearing in the lower field. For the last five days, as a result of lying quietly on his back in bed, there had been some improvement.

March 21, 1933. Examination. Tension (Schiötz) O.D. 15; O.S. 19. V.O.D., 1/200 with correction of +.25 D.sph. ⌯ .37 D. cyl. axis 90°. V.O.S., 20/20 with correction of +.25 D.sph. ⌯ .37 D. cyl. axis 90°. Fields are shown in figure 12. The left eye shows the color interlacing, so often seen in these cases exaggerated or subdued by poor fixation, but definitely present even in cases with excellent fixation. A disc as small as 3/1000 is still detected in a small area.

Right Eye. A triangular-shaped tear was readily seen and measured ophthalmoscopically in the upper temporal retina occupying about 13 degrees of field from apex to longest leg of tear base. A bullous elevation (up to 9 diopters) occupied the whole upper fundus. Otherwise, except for a mild arterial sclerosis, a few vitreous opacities and the mild but definite cataractous changes in the periphery of the lens, the eye was in very good condition. Choroidal vessels could be seen very faintly through the tear, but a retinal vessel was seen to cross the short leg of the tear. One disc diameter would hardly fill the central dilated portion of the triangular tear. Localization of the tear was carried out as described above, resulting in a measurement of the apex at 58 degrees from the macula or 3.6 mm. behind the equator on the 15-degree retinal meridian, to the temporal side of the midline.

Left Eye. Except for mild vitreous opacities and peripheral lens opacities, the fundus was in good condition without observable signs of chorioretinitis and only mild evidence of arterio-sclerosis.

Operation, March 27, 1933. A barrage microcoagulation procedure was carried out using all the devices described above. A total of 20 small pins, 8 large pins, and 3 quills was used. A tiny, shallow ignipuncture over the retinal tear, following preparation by microcoagulation and a preliminary puncture at that point with a cataract knife, was made. Probably the result would have been just as good, and, as is indicated in other cases, perhaps better as far as the future is concerned, without ignipuncture.

One the second day after the operation, the red fundus reflex was present in the pupillary area, the retina was apparently in place and all gross evidence of separation had disappeared. There were moderate chemosis and lid edema. On the fourth day, the retina though slightly edematous had a rather normal appearance except for the grayish spots of treatment visible in the neighborhood of the tear. The vision was returning as indicated by simple testing with newspaper headlines and the field was wide on gross confrontation test. The patient remained in bed twelve days at which time the eye was practically free of injection. The sutures had all been removed on the seventh day. At the end of the second week he returned home on a stretcher wearing a pupil glass on the left eye and the right eye was still bandaged. After the third week he was allowed to be up with pupil glasses and no evidence of any recurrence of separation was found on the second field examination of April 22, 1933. The retina lies smoothly without wrinkles, stria, or vitreous strands. The central vision

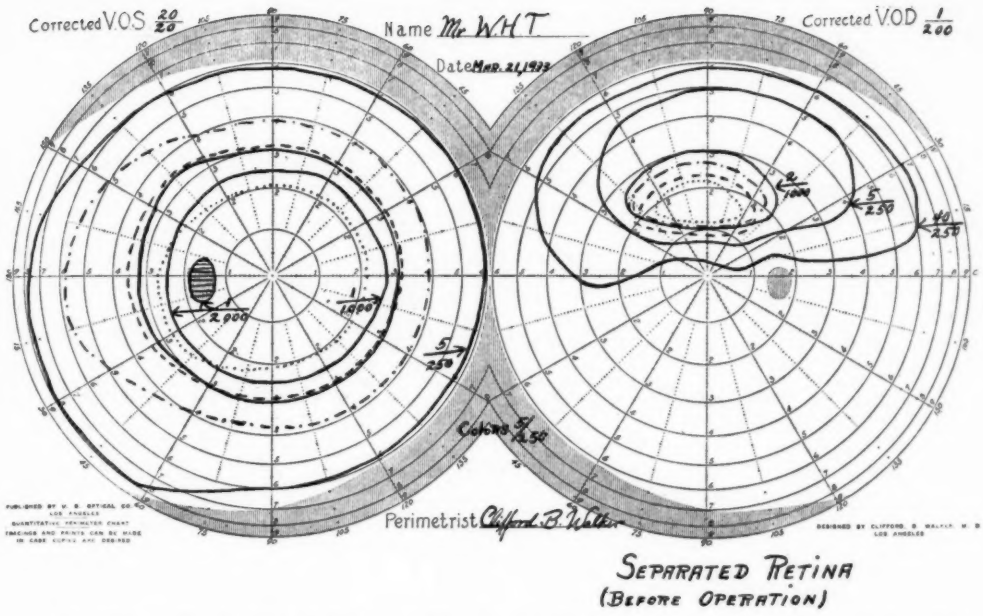

Fig. 12 (Walker). Visual fields of Mr. W. H. T. before operation. Separated retina O.D. following hemorrhage into vitreous six months previously. Color interlacing present in remaining upper field. Quantitative test objects not smaller than 2/200 can be detected.

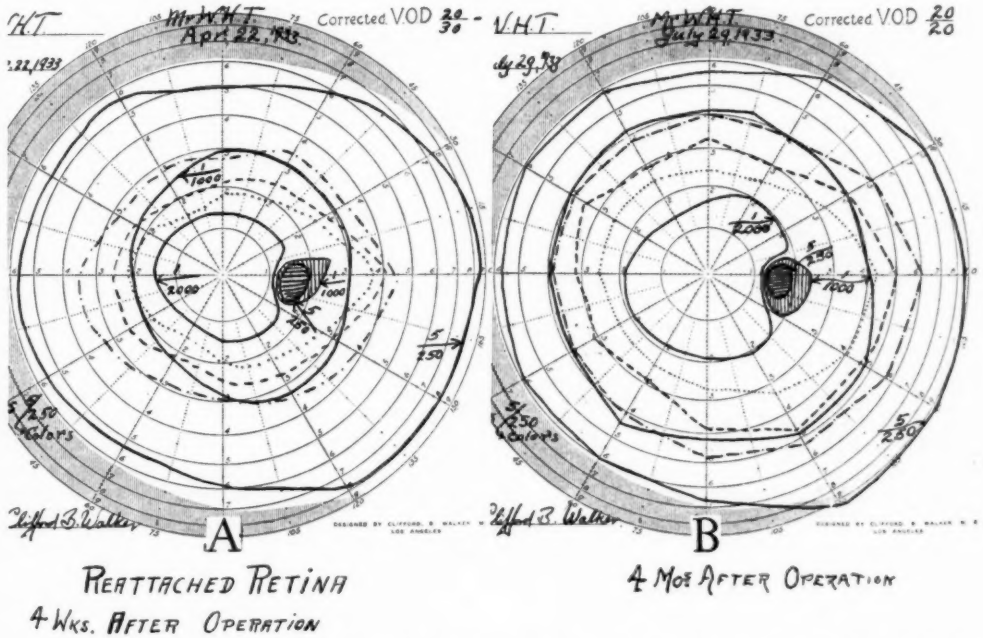

Fig. 13 (Walker). Postoperative charts, fourth week, of Mr. W. H. T. (A) Reattached retina. V.O.D. 20/30, field contracted only for colors, but interlacing, and for quantitative discs below 5/250. Test objects as small as 1/2000 easily recorded. Blind spot slightly enlarged. (B) Beginning of 5th month after operation. Futher improvement of central vision to 20/20 and of form and color fields to almost normal.

is 20/30—. The field (fig. 13, A) exhibits an expansion of the color fields without interlacing while the quantitative form field shows ability to detect motion of test objects as small as 1/2000 over an extent averaging 15 degrees. During the next three months improvement continued, and at the end of the fourth month (fig. 13, B) the central vision increased to 20/20. Color and quantitative fields have expanded until they are almost normal except for 1/2000 which is five to ten degrees below the usual average of twenty-six degrees. At the present date of proof reading, Dec. 15, 1933, there is still more, if slight, improvement.

Comment: While it is probable that this case had a tear formation and a certain amount of separation of the retina of six months' duration, dating back to the blind period supposed to be entirely due to a hemorrhage into the vitreous. It is probable also that the tear and separation did not result until scar formation and tension had developed after the absorption of the hemorrhage. In the latter case, the duration of the separation was of about one month's duration in a man of sedentary habits with a tendency to arteriosclerosis and high blood pressure, at the age of 71 years. Whether the treatment was more elaborate than necessary remains to be seen, yet in the first few months one could hardly ask for a more prompt and satisfactory result with less ocular reaction unless it could have been accomplished without resection of a muscle.

Anesthesia. The night before the operation I give three grains of sodium amytol, or an equivalent amount of substance in the barbital group. This dose is repeated the first thing in the morning. One hour before the operation the patient gets 1/12 grain of morphine and 1/200 grain of scopolamine by hypodermic injection. Three or four more of these hypodermics are held in readiness in the operating room and used according to the state of tranquillity of the patient. The morphine must be pure, standard brand, reliable, such as Merck or Parke-Davis. Hospital-contract material is liable to give the upsets one is familiar with and has heard about which I do not think come from the scopolamine alone when it is preceded by the barbital group. Certainly, I have had no difficulty following this procedure myself.

On the operating table a thorough Van Lint is done close to the periosteum reaching one inch towards the ear and orbitally as far as the supra- and infra-orbital-nerve regions. This usually takes about 2 c.c. of 2 percent novocaine and another 2 c.c. or less for the ciliary retrobulbar injection. About 6 drops of adrenalin are added to this novocaine regardless of whether the eye is in a state of low tension or not. In addition to the use of 4 percent cocaine and 1/1000 adrenalin drops, the three recti muscles and tendons are given peribulbar injections with the same strength of novocaine and adrenalin. It is notable that the retrobulbar injection is done through the Van Lint anesthesia. Under these conditions bleeding will not be very troublesome and traction on the muscles will not be very disturbing, because the patient already during these procedures may have had one or two more hypodermics of 1/12 gr. morphine and 1/200 gr. scopolamine.

Conclusions

1. Three years ago diathermy could have been dispensed with by the ophthalmologist and practically all the numerous valuable treatments which it provides could have been imitated and approximated by other treatments already at hand. Now it has been definitely established, with the addition of separated retina to the list of diathermic treatments, by the work of Larsson, Weve, and Safar and others that the ophthalmologist can hardly afford to ignore the subject longer from a practical standpoint, or if surgically inclined he should not be without recourse either in office or hospital to at least the more economical diathermic equipment.

2. While diathermy by micropuncture alone will give the greatest average success with the least labor, trauma, and sequellae of any single method at present, it is not impossible that just the right combination with other methods, such as the Gonin and possibly the Lindner-Guist, may add something to efficiency in certain cases. However, it is more probable that further perfection and knowledge of the diathermic

methods will permit all other methods to be laid aside as second choice.

3. Very small stops are necessary on micropins to keep them from going too deep, but not insulated stops, with the machine herein described. With the above-described micropins, overdosing does not occur but instead the sclera receives a small but also valuable degree of treatment (Larsson effect), which also widens the mouth of the outlet, giving better and longer drainage. Overdosing may result when the current must be used to pull out insulated pins, especially multiple in type. Therefore, single, noninsulated, cleanable pins, which can be rotated to help removal have numerous treatment advantages with only an insignificant addition of operative time, since in an unobstructed area 12 pins can be placed in about one minute.

4. Iridium-hardened platinum is the best metal for detachable micropuncture pins because it can be perfectly cleaned by heating to redness in the Bunsen flame. It gives off no oxides and produces no siderosis if by any rare accident a particle is left in the eye. It can be used repeatedly without deterioration from cleaning or sterilization.

5. Reports of loss of micropins without threads attached are numerous as well as instances where insulation collars have broken during use. When the count fails to check and it is uncertain whether the lost pin is in the orbit or on the floor, the question may be difficult to settle without an x-ray photograph. Constantly threaded iridium-platinum micropins without insulating collars have been found to be safe and satisfactory.

410 Philharmonic Auditorium Building.

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PRELIMINARY REPORT ON ORBITAL TUMORS

GUERDAN HARDY, M.D., AND WILLIAM F. HARDY, M.D.
SAINT LOUIS

Seven cases of orbital tumors are here reported. Three of these are described, with histological confirmation of the diagnosis, as instances of adenocarcinoma of the lacrimal gland, pseudotumor, and perineural fibroblastoma of the optic nerve. From the Department of Ophthalmology, Washington University School of Medicine. Read before the St. Louis Ophthalmic Society, January 27, 1933.

Statistics show tumors of the orbit to be comparatively rare. Samuels[1] reports nine orbital tumors in 35,869 cases treated at the New York Eye and Ear Infirmary and only one case at Moorfields among 52,372 admissions. Schaaf[2] found 46 cases of tumors of the orbit among 40,415 patients admitted to the Giessen Clinic during 12 years.

The cases to be described in this paper have been seen in Barnes Hospital and the Eye Clinic of Washington University during the past two years. One patient, a young boy, was cared for in the St. Louis Children's Hospital.

The types of tumors reported as occurring within the orbit are quite numerous and, as has been pointed out by recent authors, many are similar and can be grouped together. Clinically, one can only generalize as to the type of tumor and make a tentative diagnosis on the basis of probability. It is assumed, of course, that such conditions as Graves's disease, acute inflammation, mucocele, etc., have as far as possible been eliminated from the clinical picture.

As an evidence of the chaotic state in the tabulation of orbital tumors, Warthin[3] in 1901 reported 132 cases of tumors arising from the lacrimal gland alone and these were given 46 different classifications. Of these 132 neoplasms, he believed more than two thirds to be of mesoblastic origin.

In a discussion on the diagnostic significance of proptosis, W. Trotter[4] stated that cases can be divided into: (1) Those with anteroposterior displacement alone and (2) those with anteroposterior displacement combined with some other displacement. In general, (1) are the result of swelling of orbital tissues from inflammatory or circulatory disturbance, while (2) are due to a swelling of a neoplasm. Under the first group come:

A. Traumatic orbital hemorrhage.

B. Cavernous sinus thrombosis, which is usually secondary to infection elsewhere. Symptoms develop rapidly and the second eye is subsequently involved.

C. Graves's disease, which shows many variations. Permanent proptosis is a common residual symptom; after operation the exophthalmos may persist on one side.

Group 2 consists of neoplasms, including:

A. Those originating in the orbit. Such benign tumors as hydatid cysts, cysts of doubtful origin, and benign neoplasms are rare. Usually proptosis with lateral or vertical displacement indicates malignant disease.

B. Those that invade the orbit, such as growths from the ethmoid, sphenoid, or maxillary regions. Ethmoid and maxillary tumors cause early displacement in a coronal plane. Sphenoidal growths cause a downward and lateral displacement at a relatively later time. Growths in the sphenoidal region present the greatest diagnostic difficulty in early cases; the malignant tumors are usually endotheliomata or sarcomata of the periosteal type. They may develop very slowly. Displacement of the eye and pain (trigeminal) are the usual symptoms and signs.

C. Mixed tumors of the lacrimal gland.

D. Pseudotumors of the orbit.

E. Tumors of the optic nerve.

Of the seven cases here reported, five have been confirmed by operation, while two patients refused surgery. In the former group were three mixed tumors of the lacrimal gland, and one

each of perineural fibromeningoblastoma of the optic nerve and pseudotumor of the orbit. Three representative cases will be given in detail.

Mixed tumors of the lacrimal gland according to Birch-Hirschfeld[5] may show a most varied construction and are not unlike those tumors occurring in the parotid and other salivary glands. The same similarity to salivary newgrowths holds for malignancy and the incidence of recurrence after extirpation. He reports that 45 cases out of 55 remained free from recurrence for longer than a year. He warns the profession against giving a too favorable prognosis. These mixed tumors, according to this author, occur in an advanced age group, usually the sixth decade, although they may have their inception in youth or even in fetal life. For this reason they are considered benign and slow growing. The exophthalmos may be quite marked, with the eyeball usually pushed down and inwards and with restricted up and outward mobility. Though rarely affected, visual acuity may be diminished and then generally at a later stage than with malignant growths.

Case report. H. R., a white male farmer, aged 47 years, was first seen in March, 1929. Two years previously he had had lacrimation of the right eye and ten months before admission had noticed proptosis and blurring of vision. These symptoms had progressed up to the time of examination. Physical examination: The right eye was proptosed and displaced downwards and outwards. Ocular movement was present in all fields but not full, the principal limitation being up and out. Above the globe, and slightly temporally, a soft tumor could be palpated. There was neither bruit nor thrill. The right fundus showed a hyperemic swollen disc of two diopters and engorged and tortuous vessels. Visual acuity was O.D. 2/60, O.S. 6/5. The peripheral fields were full. A nose-and-throat examination revealed chronically inflamed tonsils and a left chronic maxillary sinusitis of low grade. Roentgenograms gave no aid in diagnosis. The blood Kahn test was negative.

A week after admission the tumor was removed, apparently in its capsule, through a supraorbital incision. The lacrimal glands were likewise extirpated. The pathological diagnosis of the tumor was adenocarcinoma of the lacrimal gland.

After an uneventful recovery the patient was discharged and was not seen again until February, 1931. In October, 1930, the lacrimation had returned and he felt a small mass just above the right globe. There was no pain. Physical examination: The right globe was proptosed and displaced downwards. Beneath the right supraorbital ridge was a firm nodular mass, fixed, not attached to the skin, and not tender. The fundus showed hazy disc margins and, in addition, a peculiar retinal streaking of no definite pattern. A roentgenogram showed a destructive process of the right orbital region. Because of the previous pathological diagnosis and the early recurrence, more radical surgery seemed to be indicated so an exenteration of the orbit was performed. Pathological diagnosis was mixed tumor of the lacrimal gland. An uneventful recovery followed the operation.

Pseudotumors of the orbit have been well described by Benedict and Knight[6]. They have classified pseudotumors into: (1) cases evidently of tumor but which recover spontaneously or following internal administrations of drugs, (2) cases which show no growth on exploration, and (3) cases confirmed by operation but showing only chronic inflammatory tissue in sections. In the latter group falls the case given below. Having the characteristics and symptoms of other benign and malignant tumors, diagnosis may easily be missed and the pathological report most surprising. The case to be given in detail brings out the fact that sections of small portions may give an erroneous idea of the type of the growth.

In this case the surgeons were misled by a rather confusing pathological picture. The sections, prepared without special staining were examined by several of the staff and all were in accord that the tissue was gliomatous. Because of the short duration of symptoms, the

rapidity of growth and the biopsy findings, it was decided that complete removal of the tumor should not be delayed even though the serology was known to be positive for syphilis.

Case report. M. J., a 38-year-old, colored housewife came to the eye clinic in April, 1932. Proptosis of the right eye had begun three months previously, had subsided after a week, but had recurred a month prior to entry. Associated with the proptosis was a right supraorbital headache, and for three weeks vision in the right eye had been blurred.

Physical examination: Vision was O.D. 6/10, O.S. 6/6. The right eye was proptosed and limited in upward, downward, and inward movements. The peripheral fields were normal. In the lower temporal quadrant of the right orbit a small, hard, slightly movable mass was palpated. Posterior to this a similar larger mass could be felt. The right preauricular gland was hard, discrete, and painless. The fundus was normal. The fellow eye was entirely normal. Roentgenograms of the skull and optic foramina were negative. Blood Kahn and Wassermann were positive (3 plus Wassermann and 4 plus Kahn).

A biopsy was performed, reaching the tumor through an incision in the right lower cul-de-sac. At that time a tumor could be felt extending along the inferolateral wall of the orbit and apparently attached to it. Pathological report of the biopsy tissue was glioma of the optic nerve. Shortly after this a Krönlein operation was performed and the tumor removed. It was found to involve the orbit to the apex, to surround the optic nerve, and to be inseparable from it. Recovery was uneventful but the patient has a blind squinting eye. Serial sections of the material removed during the second operation showed a different picture from the biopsy and after considerable study by the pathologists it was diagnosed as chronic inflammatory tissue and subsequently as pseudotumor of the orbit.

According to Fuchs[7], **primary tumors of the optic nerve** are rare. Some have the structure of endotheliomata and spring from the dural sheath. Gliomata develop in the nerve trunk itself. The primary tumors of the optic nerve begin generally in youth and grow very slowly. They cause an exophthalmos, distinguished from that occurring with other orbital tumors by the fact that the lateral displacement is entirely absent or is at all events insignificant. Mobility of the eye remains good for a comparatively long time; on the other hand, and this is characteristic, blindness sets in very early. With the ophthalmoscope we find at first a neuritis, with venous engorgement particularly marked; afterwards atrophy occurs.

H. Rönne[8] quotes Jocqs to the effect that one third of all cases of tumors of the optic nerve occur in the first decade of life and one third in the second decade. According to Hudson[9], 62 percent of cases are found before the tenth year and 90 percent before the twentieth year. This high percentage (Hudson) applies only when speaking of true intradural tumors whereas those from the dura appear in adult life.

Case report: C. S., a young laborer, aged 20 years, entered Barnes Hospital in September, 1930. For two years previously he had had numbness of the left side of the face and progressive blurring of vision in the left eye. A left external ophthalmoplegia had been present for fifteen months. At times diplopia was noticed. During this time he experienced pain over the left eye and in the left orbit, of a sharp cutting character. Such attacks would occur several times daily and last ten to fifteen minutes. His general health had been good.

Physical examination: Vision O.D. 6/6, O.S. counted fingers at three meters. Ocular movements of the left eye were practically abolished, there being no movement to the nasal side and very little movement upwards, downwards, and outwards. The lid drooped and the globe was divergent. Measurement with the exophthalmometer indicated no exophthalmos. Pupillary reaction to light was absent. The left peripheral field revealed an upper nasal defect. The disc was markedly choked. The opposite eye was normal externally and internally Roentgenograms of the skull and orbit were negative. Sinus films

showed a left maxillary sinusitis. The blood Kahn was negative for syphilis.

Suspecting an intracranial involvement the region was explored by the neurosurgical department and a hard cartilaginous mass was found at the apex of the orbit. Only a small portion was removed which on sectioning proved to be a perineural fibroblastoma of the optic nerve. Sight was completely lost so an exenteration of the orbit was later performed.

Summary

The impressions gained from the observation of these cases may be summarized briefly as follows: 1. The occurrence of seven orbital tumors in the service of one man in a single hospital group over a period of two years seems disproportionately large. Five of these were confirmed by operation and of these one was debatable; whether it was a true or pseudonewgrowth is not definitively settled.

2. As a generalization the more anterior the growth the better the prognosis. Those involving the apex, by reason of the close proximity of the important structures subject to pressure, must offer a worse prognosis and a challenge to surgery.

3. Primary tumors of the optic nerve afford a bad prognosis since blindness sets in early and removal is frequently accompanied by the same result.

4. Brilliant results are not to be expected from surgery either with regard to vision or cosmetic appearance.

5. Pseudotumors are difficult of diagnosis and it is not surprising that mistakes in diagnosis and therapy occur. In the case herein recorded the points in favor of tumor were: (a) unilateral exophthalmos, (b) a biopsy with a resultant diagnosis of glioma. Those against glioma were (a) the preservation of fair vision, and (b) the presence of a positive Wassermann reaction. Since the latter is a common finding in the colored race it was natural to discount its importance, especially with a biopsy diagnosis of glioma. Finally, it is fair to assume that blindness due to cicatricial changes, would have eventually occurred even under energetic antiluetic treatment.

Humboldt Building

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CONICAL CORNEA COMPLICATED BY ACUTE ECTASIA

Report of a case

GEORGE E. BERNER, M.D.
PHILADELPHIA

Reports of this condition are infrequent in the literature. The author's case appeared in a young girl with bilateral keratoconus, the ectasia occurring in the left eye. The slitlamp established the elevation as due to infiltration of fluid in the spaces of the substantia propria. Paracentesis was repeatedly effective in reducing the ectasia and the opacity. After healing, conical glasses, bilaterally, improved the vision to 6/9-1. From the clinic of Dr. Francis H. Adler, Wills Hospital.

In the rather extensive literature on conical cornea, reports of acute ectasia complicating this condition are rather rare.

In 1906 Terrien[1] in the Archives d'Ophtalmologie reported a case and stated that he had been unable to find a previous report. G. A. Rabinovitch[2] in 1908 reported in a Russian journal a case of acute transitory ectasis of a conical cornea, and nothing further can be found until 1911, when Cooke[3] presented to the Royal Ophthalmic Society a similar case which he treated by excising an elliptical portion of the protrusion. Another hiatus in the literature on this subject ended in 1924, when Reid[4] demonstrated to the same society a case of conical cornea following a malignant course in which opacity and bulging of the cornea followed a mild conjunctival infection. He does not use the word ectasis and one gathers from his article that the entire cornea became opaque and protuberant, rather than ectatic in a small portion. The most complete report, with slitlamp study, is given by Rollet[5] in the Annals d'Oculistique for 1929, but he gives no review of the literature. His case was treated by sclerectomy. In the same year Goulden[6] reported to the Royal Society a case of keratoconus with descemetocele, but the history obtained was very poor and there is no way of determining whether the condition occurred spontaneously or if it followed a corneal infection.

Jaensch[7], in his exhaustive study of the literature of the past twenty years, published in 1929, makes no note of the condition.

I wish, therefore, to report the following case:

Case Report. Miss T. W., aged 14 years, was admitted to the clinic of the Wills Hospital on January 21, 1933, complaining of a sudden blurring of vision of the left eye and a grey protuberance of the cornea. She stated that this had occurred while she had been playing basketball the evening before, although there had been no trauma to the eye or the head.

Her parents said that her vision had been good until the age of eight years, when it began to fail and it continued to decrease in spite of the constant wearing of glasses which did not improve the condition. At no time was there pain or inflammation of either eye. General health had always been good and the history disclosed no serious illness.

The patient was admitted to the hospital and examination showed:

Vision: O.D. 6/60; O.S. 1/60 with no improvement with glass or pinhole.

The lids and sacs of both eyes were normal and rotations full.

O.D. The conjunctiva was normal, the cornea clear; typical keratoconus. The iris was also normal, but the view of the fundus was blurred, although no lesions were seen.

O.S. had a normal conjunctiva. The cornea presented a keratoconus with the apex of the cone grey, opaque, and bulging far forward, apparently on the point of rupture.

A pressure bandage was applied, but during the next few days the ectasia increased slightly.

On February 1, Dr. Cowan gave a report of the slitlamp examination, as follows:

O.D. The cornea in the center shows an increased convexity and moderate thinning, with several groups of paral-

lel folds. There is very little loss of transparency with just a suggestion of yellowish discoloration around the base of the cone.

O.S. The central portion of the cornea bulges forward in a globula-fashion, 2 mm. in the lower part and 3 mm. above. The cornea in this area is very relucent, almost opaque, and has a very irregular surface. With a narrow slit it can be seen that the elevation is due to infiltration of mostly clear fluid in the spaces of the cornea propria, the whole cornea giving the appearance of a large bulla.

On February 4, because of steady enlargement of the ectasis, paracentesis was done with a keratome at the limbus, at "3 o'clock," and a moderately firm bandage applied.

The next day showed a remarkable improvement with the area of infiltra-

Fig. 1 (Berner). Appearance of ectasia of the cornea before operation.

tion half the former size, the anterior chamber reformed, and no ectasia.

The second day after operation the apex was again protruding slightly and the wound was reopened with a spatula. The ectasia receded, the opaque area became still smaller, and the wound was again opened.

On the fourth day the wound was healed too firmly to be opened with a blunt instrument, and from then on until the patient was discharged the cornea was of approximately the same shape as the right one. The apex of the cone was touched daily with a 1-percent solution of formalin with the object of

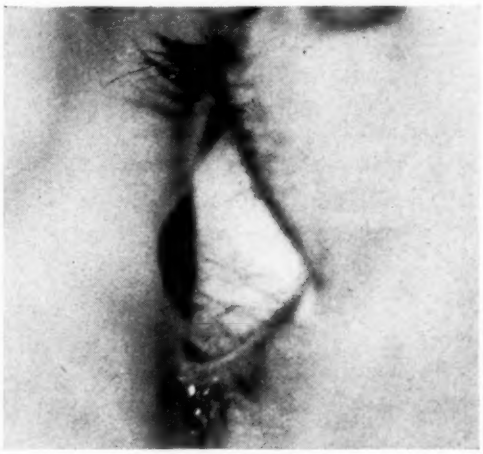

Fig. 2 (Berner). Appearance of cornea after operation.

producing a tough, resistant scar. On discharge, the apex of the cone, about 4 mm. in diameter, was a fairly dense leucoma which the slitlamp showed to be quite thin at the extreme apex.

The right eye was fitted with a Zeiss contact glass which improved the vision to 6/9 minus one. After recovery from the operation the same glass was applied to the left eye, with the surprising result of improving the vision to 6/9 minus one. The patient is able to apply the glass herself and before leaving the hospital wore it on the right eye for a period of five hours.

The pictures showing the curvature of the cornea before and after operation demonstrate more clearly than words the recession of the ectasia.

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KERATITIS BULLOSA

With report of a case cured by x-ray

WILLIAM THORNWALL DAVIS, M.D.
WASHINGTON

The author reports a case of keratitis bullosa which resisted medical and surgical procedures but responded well to x-ray treatment. The recent literature reveals that the exact etiology of keratitis bullosa is not understood and treatment is usually unsatisfactory, the end result being seriously reduced vision, blindness, or enucleation. An etiological classification is given. Read before the Section on Ophthalmology of the Medical Society of the District of Columbia, November, 1932.

Keratitis bullosa is an uncommon condition. It is generally agreed that it is an intractable disease resisting the usual forms of treatment, and resulting either in considerable impairment of vision or destruction of the eye.

The characteristic symptoms are recurrent attacks of severe pain, irritation, and photophobia, together with the formation of one or more large blebs which recur at intervals over an indefinite period. These blebs rupture, leaving an abraded area. Constant repetition of the blebs with the attendant inflammation causes scarring of the cornea and impairment or loss of the vision, or destruction of the eye.

For purposes of description bullous keratitis may be described as:

1. Primary: occuring spontaneously in an apparently healthy individual with no history of trauma. During the course of the disease the intraocular pressure may be increased. This is the form with which we are concerned at this time.
2. Secondary:

a. Traumatic. (1) Abrasion of the corneal epithelium: traumatic relapsing keratitis. (2) Intraocular foreign body with iridocyclitis, increased intraocular pressure, panophthalmitis or phthisis bulbi.

b. In association with glaucoma and iridocyclitis.

c. Dystrophic—pannus degenerativus of Fuchs.

The exact mode of the production of the blebs is not certainly known.

Fuchs[1] noted in glaucoma that edema was more marked in the anterior layers of the cornea. He inferred that the increased intraocular pressure forced the aqueous through Descemet's membrane into the corneal layers and by way of the individual nerve channels in Bowman's membrane to the epithelium, thus separating the epithelium from its base. Friedenwald[2] is also of this opinion, stating that the corneal endothelium when injured acts as an imperfect barrier.

Bernbacker and Czernak[3] believed it was analogous to herpes zoster: a trophic disturbance of the nerve terminals in the epithelium.

Brugger[4] pointed out that there was a rapid production of cells which broke down for lack of support and in these spaces the corneal fluid collected.

Hess and Nuel[5] came to the conclusion that edema, lymph stasis, and lack of cell nutrition resulted in liquefaction of the cells and bleb formation.

Fuchs's description of the formation of the bleb in pannus degenerativus is interesting and instructive. He says "Pannus degenerativus begins with formation of small gaps in Bowman's membrane. These gaps probably represent the places where the corneal nerves go through. They become filled with a fibrous connective tissue: this, overflowing the margin of the gaps, pushes the epithelium before it and spreads farther and farther between the epithelium and Bowman's membrane. Liquid col-

lects between Bowman's membrane and this connective tissue layer so that the latter with the epithelium is lifted up to form the wall of the bleb, Bowman's membrane itself remaining in place.

"Sclerosis of the cornea (Meller) is but a later development of pannus degenerativus. The deposit is of considerable amount, has few nuclei and is of lamellar structure. The cornea is opaquely white so as to look like the sclera, while in ordinary pannus degenerativus there is only moderate opacity. Sclerosis is not associated with glaucoma and iritis, but occurs after repeated operations."

De Schweinitz[6] pointed out that keratitis bullosa is in many instances a symptom and not a separate disease, inasmuch as it consists in the formation of one or more small blebs of short duration (keratitis vesiculosa) or of larger blebs of more enduring existence (keratitis bullosa) upon the cornea of an eye the subject of iridocyclitis, interstitial keratitis, or glaucoma.

Relapsing keratitis bullosa or relapsing erosion of the cornea occurs at intervals following injury, with the formation of vesicles or bullae, or simply an erosion. The histopathology is inadequately understood, but is probably quite different from the primary bullous keratitis with which we are at present concerned.

Zentmayer[7] noted that using the term "bullous" in describing some of these may lead to confusion. Bullous keratitis and vesicular keratitis have a different pathology. In bullous keratitis there is an abnormal condition of the epithelium, with a newly formed tissue between it and Bowman's membrane, whereas in vesicular keratitis the epithelium is normal.

Gilbert's[8] summation of the pathology of bullous keratitis was that there is no intercellular but rather an intracellular accumulation of fluid. A sort of ballooning of the cell goes on, until the protoplasm appears homogeneous and the nucleus disappears. Eventually the cell wall breaks. This occurs in a number of contiguous cells and results in the formation of spaces. The basal cells seem especially prone to this change. He thinks it is not a simple lifting of the epithelium, but that the bleb formation is accomplished only at the expense of the basal cells. The fluid is not secreted in the cell body, but rather the whole cell undergoes a mucous degeneration. But the pathological process does not end here. In the later stages blood vessels unaccompanied by fibrous tissue come from the limbus. It is therefore a degenerative process and not a true keratitis.

Collins and Mayou[9] stated that the new epithelium that forms fails to acquire the necessary firm attachment to Bowman's membrane.

It has been stated by most investigators that Bowman's membrane is not involved but, in some cases, it is undoubtedly involved as are also the anterior lamellae of the cornea.

Ziegler[10], referring to sympathetic etiology said that it has been controlled by the use of "sympathetic control," a mixture of hyoscine, morphine, and pilocarpine. An injection of these three drugs will modify bullous keratitis, when sympathetic disturbance is the cause.

The disease runs a chronic course. For years there will be recurrent attacks of pain, so severe that the patient may request enucleation. The vision is gradually and seriously impaired; it seems fortunate that any vision is retained after so much disturbance of the corneal tissue. If glaucoma does not already exist, the intraocular pressure usually becomes elevated.

The treatment consists in relieving the symptoms, removal of the bleb, and prevention of its recurrence and of complications. Holocaine seems to have been used chiefly to relieve the pain; for obvious reasons cocaine is contraindicated. Dionin and atropine have been used in the early stages with a pressure bandage, with pilocarpine or iridectomy if the tension becomes increased. Because of the periodicity quinine has been tried.

After removal of the bleb the base is touched with tincture of iodine or silver nitrate. Parker[11] reported a cure with the use of galvano-cautery. Griscom[12] reports three cases which responded to treatment of the nasal sinuses. In Gala's[13] patient the removal of the su-

perior cervical sympathetic ganglion effected a cure.

If these measures fail, enucleation may have to be done to relieve the pain, or if panophthalmitis develops as the result of perforating ulcer. Enucleation also seems to prevent a sympathetic-like similar condition in the other eye. Hence the prognosis either as to vision or saving the eye is poor.

Case report

Mrs. R. W. K., aged 61 years, was first seen May 9, 1931. At this time she was suffering severely with irritation and inflammation of both eyes. There was intense photophobia and blepharospasm, so marked that it was impossible for her to extend her head or to open her eyes. The pain was almost continual and completely incapacitated her for any duties.

She stated that she had been suffering with these symptoms since May, 1930, and that there were acute attacks at frequent intervals, but that she was never entirely free from pain and irritation.

Examination of the right eye at the first consultation was as follows: There was a large superficial branched opacity, rather thin, over the middle third of the cornea. The medial portion of the parenchyma appeared normal. The posterior layer showed disturbances, the character of which was doubtful. The iris appeared normal. There was moderate irritation, blepharospasm, photophobia, and pain.

The left eye showed a large bulla covering the central three fourths of the cornea. The anterior capsule of the lens showed several large clumps of brown pigment. There was violent pain and irritation. Two-percent homatropine and one-percent holocaine every two hours, were prescribed, together with hot fomentations and boric-acid salve.

Family History: Her mother had had high blood pressure and had died of cerebral hemorrhage. One eye had been enucleated previously to her death. The exact reason for the enucleation is not known, but it was probably glaucoma.

Past History: She had always been nervous; had had no children. Her husband died of arteriosclerosis. She has been operated upon for hemorrhoids, has some indigestion, and thinks she has always tired easily. Her general examination, as reported by Dr. H. C. Macatee, revealed one crowned tooth which suggested infection. Blood pressure was 180/95. Otherwise her general condition was without pathological significance.

Present Condition: As described. Before May, 1930, she had hazy vision, but did not know what caused it. The first definite attack was in May, 1930. The condition has continually persisted since that time with acute exacerbations.

The pupils were moderately dilated by the homatropine, the right more than the left. In the right eye, the fundus appeared normal, but could not be satisfactorily seen on account of the corneal macula.

With the slitlamp, the corneal scar was found to be quite thin, superficial, and to have a large clear area in its confines. There was bedewing of the endothelium. When using the scleral scatter, definite circinate areas could be observed in the posterior layers of the cornea. The exact location and character of these lesions could not be determined owing to the haziness of the superficial layers of the cornea. Tension was 22 mm. Hg (Schiötz).

In the left eye, the bulla had disappeared. The cornea was stippled in the area where the bulla had been. The slitlamp showed a condition similar to that in the right cornea. Several posterior synechiae were observed. Tension was 17 mm. Hg (Schiötz).

The course of the case continued about the same, with at times considerable improvement, and at other times, violently acute exacerbations. Pilocarpine, dionin, holocaine, the iodides, and other things, were prescribed without appreciable result.

On June 2, 1931, the epithelium of the left cornea, which could be lifted on a spatula, was removed and the cornea touched with one-percent silver nitrate. At the same time an iridectomy was done. The patient thought there was some improvement after a week, but it was only temporary, and the attacks continued as before.

On July 16, 1931, it occurred to me that perhaps x-ray treatment might be of value and with this thought in mind the patient was referred to Dr. Thomas A. Groover. His report was as follows:

"Left eye: Roentgen therapy was begun July 18, 1931, and concluded January 18, 1932. Total number of treatments, 13. Dosage factors: 5 milliamperes, 140 kilovolts, 10-inch distance, 5 millimeters aluminum filter, time of exposure 2½ minutes. This equals 90 international r units or about one third of the amount required to produce a mild erythema of the skin. The minimum interval between treatments was one week. The lids were kept open as much as possible and the surrounding skin was protected by a lead shield.

"Some improvement began in the left eye after the first two or three treatments. Since the fifth treatment on August 28, 1931, the eye has caused her practically no discomfort.

"Right eye: Roentgentherapy was begun August 1, 1931, and concluded June 3, 1932. The total number of treatments was 18, the technic being the same as that employed for the left eye, except that for the last four treatments the dosage was reduced 50 percent.

"On the whole the response to treatment was not quite as satisfactory as that of the left eye. After the thirteenth treatment on March 1, 1932, there was considerable redness and swelling of the conjunctiva, which developed shortly after an operation; possibly the operation and roentgentherapy were joint factors in causing this. It proved annoying for two or three months, but she has been practically symptom free for the past six months.

"Comment: The eye tolerated irradiation to about the same degree as the skin, and it is suggested that roentgen therapy may have as wide a field of usefulness in disease of the eye as it does in dermatological practice."

Only July 18, 1931, the following notes were made:

Right eye: The slitlamp with retroillumination showed in the most superficial portion of the cornea, in the pupillary area, rays of hairlike lines possibly due to loosening of the epithelium. On or in Descemet's membrane or in the most posterior layers of the cornea were noted a number of brownish semicircles, the character of which could not be made out. There were folds in Descemet's membrane.

Left eye: There was no evidence of loose epithelium. There were seen, however, irregular markings in the surface epithelium like the appearance of blisters in glass. The endothelium showed changes and there was folding of Descemet's membrane.

An attempt was made to get a photograph of the cornea, but the photophobia and blepharospasm were so intense that it was not possible.

On February 12, 1932, the epithelium was removed from the right cornea since it was hanging in folds, and was apparently necrotic.

The following notes were made on October 17, 1932:

Tension, O.D. 25; O.S. 27 mm. Hg (Schiötz).

Right Eye: Oblique illumination showed the center of the cornea to be occupied by a disciform scar. The iris threw a faint, very broad shadow upon the lens, which seems to suggest changes in the nucleus only. The slitlamp did not show any changes in the lens.

Vision was 10/200 with –2.0 sph. She could read the headlines in the newspaper without glasses, but they did not improve her near vision.

Left Eye: The findings were the same except that the scar was denser. Vision was 6/200 with a –2.0 sph.

The eyes are entirely quiet; there is no irritation, photophobia nor blepharospasm. The patient has complete comfort and can do coarse sewing. She is the type of person, however, who gets full value from what vision she has.

One feels assured that this patient is cured, since she has had no symptoms for six months.

The cause of the changes in the crystalline lens is of interest: Are they due to the long continued corneal disturbance, to senility, or might the x-ray have been a factor in bringing them about?

927 Farragut Square.

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THE TESTING OF VISUAL ACUITY

I. Factors in the sensitive use of the test for the detection of errors of refraction

C. E. FERREE, PH.D. AND G. RAND, PH.D.
BALTIMORE

Refraction tests should not be restricted to the conditions which give the best reading ability, but should include also those which test primarily the clearness of the image formed on the retina. This is accomplished by amplifying the usual equipment with means of varying the illumination of the test object and the relative coefficients of reflection. These are of great value in the detection and correction of the refractive error particularly in astigmatism, and especially in the placement of the axis. From the Research Laboratory of Physiological Optics, Wilmer Ophthalmological Institute, Johns Hopkins Medical School.

Introduction. There are three important factors in the visibility of the image on the retina: its clearness, its subjective or sensation difference from the background, and its size. It is obvious that if we wished to determine the effect of clearness of image on clearness of seeing we should not make the determination in the presence of a high value of the other two factors. Conversely, if we wished to use clearness of seeing or acuity for the detection of flaws in the image, we obviously also should not conduct the test with a high value of these other two cardinal factors.

Writers and workers in this field early recognized that size of object must be reduced to a minimum if we wish to obtain a good sensitivity for the acuity method for the detection of errors of refraction. No one would have recommended, for example, that large test letters be used for a decision as to which correcting glass best remedies defects in imagery. It is somewhat strange, therefore, that they should have completely overlooked the other extremely important factor, namely the sensation difference from the background.

Relation to background, intensity of illumination, and composition and color of light. In the use of objects and background neutral as to color there are two ways of decreasing the sensation difference between them. One is by decreasing the difference in the coefficients of reflection. That is, gray test objects can be used on white backgrounds, black objects on gray backgrounds, a lighter gray on a darker gray, darker gray on a lighter gray, etc. Of these possibilities black letters on a gray ground are of course the most feasible. Another way is to use a fairly high difference in coefficient of reflection, as is the case of the customary black on white, and decrease the intensity of illumination. That is, with a given difference in coefficient of reflection between object and background the sensation difference decreases rapidly with decrease in the intensity of illumination. When the illumination is made sufficiently low this difference becomes subthreshold and the object becomes indistinguishable from the background.

Two reasons may be offered for raising here the question of the use of grays in the printing of test charts. (a) Because of new experimental data which we have obtained we wished again to call attention to the principles involved in the sensitive use of the acuity method for the detection of defects in the formation of the image. It would seem that refractionists have frequently planned their tests with reference to the physical relation of the test object to its background and the intensity of illumination employed, as if their purpose was to give the patient good vision in spite of his condition of refraction. For example, many stock refraction equipments have 20 ft.c. or more of illumination on a chart made up of black test objects on a white background. Under these conditions the discriminative power of the retina is well advanced towards its maximum.

The purpose is correct and to be recommended when one is planning the printed page or other conditions of work for the patient; but it defeats the use of the powers of vision for determining whether or not a clear image is formed on the retina. This latter purpose is best served when the influence of the other factors which contribute to clear vision is minimized and the power to see is made to depend as much as possible on the clearness of the image formed on the retina. And (b) we wished to offer an alternative to the use of low illumination for increasing the sensitivity of the acuity method for detecting errors in refraction in case, for any reason, an alternative is needed or desired.

The following considerations pro and con for the use of grays in the printing of charts may be noted. (1) Satisfactory grays are difficult to obtain, to preserve, and to standardize. On the other hand it may be noted that white also is difficult to preserve and to standardize. It soils easily and the whites that are used for charts often differ initially in coefficient of reflection, and, further, the coefficient soon changes with use unless great care is taken to protect it from change. (2) Practitioners are accustomed to black letters on white. This, however, is a matter only of habit and education. It is by no means prohibitive of the use of a different procedure. (3) A smaller difference between test object and background, for example black letters on gray, would give a different rating of vision from black on white. The results obtained would, therefore, be unsuitable for comparison with those obtained from black on white and for rating the eye's power to read the printed page. No harm would come from this, however, if the gray charts were used only for the purpose of selecting the glass which gives the clearest image. The most satisfactory and feasible way to use all devices for increasing sensitivity is, perhaps, to carry the correction as far as can be by the customary and less sensitive methods and complete the test at higher sensitivity. When in doubt whether an astigmatism is fully corrected or which is the better of two correcting glasses, the use of a more sensitive method is of great help and saves a great deal of time. In other words low visibility charts are not intended to supplant the present charts but to supplement them at the discretion of the examiner. Devices for increasing sensitivity have, of course, their greatest serviceability in testing refraction of the eyes of the young and of early middle age. (4) The small sensation difference between object and background which is needed for the sensitive detection of refractive errors can be secured more feasibly and without disturbing the standard conditions of the printed chart in another way; namely, by decreasing the intensity of the illumination. This method also has the further advantage that the sensation difference between test object and background can be varied as desired in continuous change from high to low. All possible differences are thus easily and conveniently made available. The latitude in the possible relations to background that is thus made available to the examiner is in our opinion much to be preferred to any fixed relation that could be selected. Without doubt the combination of the two factors, difference in coefficient between test object and background and variable illumination, could also be utilized to great advantage in testing and correcting refractive errors. In other words, it would be of advantage and not at all infeasible or unduly expensive to see that each refraction equipment is provided with a means of varying the illumination and with charts having more than one difference in coefficient of reflection between test object and background.

When variation of intensity of illumination is used as a means of increasing sensitivity, the variation should, of course, be produced without change in the composition and color of light. The use of a rheostat for varying the intensity of illumination is highly objectionable because of the very great change in composition and color of light that is produced at the low intensities of illumination that are needed to give

a sensitive correction. The change in the composition of light, that is, the shift towards the red end of the spectrum, introduces a residual blurring of the image that can not be eliminated by any correction that is used or in fact by any correction that is possible. When illuminated by red or orange light there is an unclearness and fuzziness of the test object which resists all attempts at correction. This is inherent in the imagery and can not be eliminated. Among the causal factors of poor imagery may be mentioned uncorrected chromatic aberration; the blurring and confusing patterns formed about each point in the image caused by the diffraction of the light near the edges of the pupil and wherever else an opacity or striation is present in the path of the beam of light; and veiling glare due to the scattering of light by the media of the eye. The errors due to all of these factors are relatively high in this part of the spectrum. All factors that contribute to poor imagery, extraneous to the errors for which the correction is being made, are necessarily a handicap to the detection and correction of these errors. Also in case of a radical shift in the composition of light towards either end of the spectrum there is danger that a false correction may be given for hyperopia, hyperopic astigmatism, myopia, and myopic astigmatism. A shift towards the red end of the spectrum would, for example, tend to cause an overcorrection of the hyperopias and an undercorrection of the myopias. While small errors may not be of serious consequence in the spheric correction they are of decided consequence in the cylindric correction, and these devices for high sensitivity are intended and needed especially for the cylinder correction. Further, it is difficult to get the reduction to the low illumination that is required by means of a rheostat, unless special care is exercised in its planning and construction; more care than is ordinarily taken with refraction equipment.

In previous papers[1] we have discussed low illumination as a means of securing increased sensitivity in refraction work. In the first of these, two sets of results were given showing the sensitivity of the method for the correction of an astigmatism: (a) the minimum diopter value of the error that could be detected at various intensities of illumination was given, and (b) the smallest detectable error in the placement of the axis of the correcting cylinder for astigmatisms of known diopter values. In order that we might know as far as possible the diopter value that was present in both cases and the exact amount of error in the placement of the axis in the second case, artificial astigmatisms were used. It is our purpose in the present paper to present a brief series of results to show that difference in coefficient of reflection between test object and background is a factor in the sensitive use of the acuity method for the detection and correction of the refractive error for which high sensitivity is most needed; namely an astigmatism.

Size of pupil: In listing the factors that contribute to clear vision both in connection with and in spite of the condition of refraction, size of pupil should not be ignored. A very small pupil, it will be remembered, renders the eye almost independent of the condition of refraction. Too large a pupil is also unfavorable because of spherical aberration and other refractive errors that may result from using the periphery of the refracting system for which no correction is planned in the lenses used in the test or to be worn by the patient. These residual errors of refraction blur the image at all stages of the correction and render the test correspondingly insensitive. The size of pupil induced by low illumination is probably a favorable compromise. We are now conducting a series of experiments for the purpose of determining as nearly as possible the optimum size or range of sizes of pupil for a sensitive correction of astigmatism and other errors of refraction. In this connection it should be remembered that a means for varying illumination places at the examiner's disposal a way of varying the size of the pupil as well as the sensation difference between the test object and its background.

Method of working and results

Two types of experiment have been conducted. In the first type we have shown the part relation to background plays in the amount of refractive error that is required to blur beyond discrimination a given size of detail in the object viewed. In other words, from the results obtained in this series of experiments it can be ascertained just what amount of refractive error can be detected with a test object subtending a given value of visual angle with different relations of test object to background, by an eye with good powers of vision. Three methods of producing the refractive error or blurring the image have been used: by using plus spheres of different values; by using plus cylinders of different strengths; and by creating and correcting astigmatisms of different values and then displacing the axis of the correcting cylinder by different amounts.

In all three cases the broken circle was used as test object. Its coefficient of reflection was 3.5 percent. The detail to be discriminated subtended an angle of 1 minute at the eye. The test was conducted at a distance of 6 meters. Ten backgrounds (coefficients of reflection 75, 60, 50, 40, 30, 25, 20, 15, 10, and 7.5 percent) and three intensities of illumination (5, 10, and 20 ft.c.) were employed. In case of the cylinders used, the detail of the test object to be discriminated was rotated in turn both into the meridian of greatest and least blurring. We have used the expression least blurring here because the powers of discrimination are lowered by a cylinder, at least when the broken circle is used as test object, both in the meridian having the curvature and at right angles to that meridian. This seems to be due to the distortion of the test object by the action of the cylinder. This distortion affects the power of discrimination more for some shapes of test object than for others. It is particularly effective in the case of the broken circle. It is because of this that the broken circle has its peculiar merits as test object. That is, while it presents only a single detail to be discriminated it is affected by refractive irregularities in all meridians regardless of the position into which the detail is turned. It thus combines to an unusual degree the merits of a simple and complex test object.

The results for these three cases are given in tables 1, 2, and 3. In connection with the results of these tables the following points may be noted:

(1) The amount of refractive error that can be detected by a given size of test object sustains a very important relation to the difference in coefficient of reflection between test object and background. Much smaller errors can be detected when this difference is small than when it is great.

(2) When the test object is black and the background white, the amount of refractive error that may remain in case of an eye with good powers of vision when the refractionist does not attempt to correct to better than 6/6 vision is rather astonishingly large. It varies a great deal with intensity of illumination, as will be seen in tables 1-3, being much greater for high than for low intensities. Even at 20 ft.c., a high illumination, it may amount to 0.50 D. in case of myopia, and in case of simple astigmatisms to 0.87 D. When the strength of the correcting cylinder is right but the placement of the axis is wrong, the error in the placement may amount to twenty-two degrees for 1 D. cylinder; while for a 0.50 and 0.25 D. cylinder a ninety-degree displacement of the axis may not blur the test object below the threshold of discrimination.

(3) When the test object is black and the background gray the amount of refractive error that may escape detection by the use of the 6/6 line on the chart is less. For example, when the test object is black and the background a gray of 10 percent coefficient of reflection, the amount of myopia that would escape detection at 20 ft.c. would not, for the eye represented in the tables, be greater than 0.12 D., and the amount of simple astigmatism not greater than 0.12 D. The error in the placement of the correcting cylinder in case of a 1.0 D. cylinder would not be greater than 1.5 degrees; for a 0.50 D. cylinder not greater than four degrees;

Table 1

SHOWING THE AMOUNT OF REFRACTIVE ERROR THAT IS REQUIRED TO BLUR TEST OBJECT BEYOND DISCRIMINATION. REFRACTIVE ERROR PRODUCED BY PLUS SPHERES. TEST OBJECT: BROKEN CIRCLE WITH CRITICAL DETAIL SUBTENDING 1-MINUTE VISUAL ANGLE. DISTANCE OF TEST OBJECT 6 METERS. COEFFICIENT OF REFLECTION OF TEST OBJECT 3 PERCENT; OF BACKGROUNDS 75 TO 7.5 PERCENT.

Coefficient of reflection of background (percent)	Strength of plus sphere required to blur test object beyond discrimination		
	5 ft.c.	10 ft.c.	20 ft.c.
75	+0.25	+0.37	+0.50
60	+0.25	+0.37	+0.37
50	+0.12	+0.25	+0.37
40	+0.12	+0.25	+0.37
30	+0.12	+0.12	+0.37
25	+0.12	+0.12	+0.25
20	—*	+0.12	+0.25
15	—	+0.12	+0.12
10	—	—	+0.12
7.5	—	—	+0.12

* In this and the following tables, — is used to indicate that the critical detail of the test object could not be discriminated.

and for a 0.25 D. cylinder not greater than ten degrees.

But, it may be pointed out, a careful refractionist will not stop at the 6/6 line on the chart. In this connection it also may be pointed out, that not much opportunity is afforded him for a sensitive correction below the 6/6 line in the charts ordinarily used. That is, below this line only two steps are provided and these steps are too large to be of satisfactory service. However, we are not so much concerned at this time with the deficiencies in the charts that are now provided as we are with comparing the possibilities of obtaining maximum sensitivity with black on white and black on gray. A fourth set of conditions was employed for the purpose of making this comparison.

It is obvious that in the use of visual angle as a means of detecting blurring

Table 2

SHOWING THE AMOUNT OF REFRACTIVE ERROR THAT IS REQUIRED TO BLUR TEST OBJECT BEYOND DISCRIMINATION. REFRACTIVE ERROR PRODUCED BY PLUS CYLINDERS. TEST OBJECT: BROKEN CIRCLE WITH CRITICAL DETAIL SUBTENDING 1-MINUTE VISUAL ANGLE. DISTANCE OF TEST OBJECT 6 METERS. COEFFICIENT OF REFLECTION OF TEST OBJECT 3 PERCENT; OF BACKGROUNDS 75 TO 7.5 PERCENT.

Coefficient of reflection of background (percent)	Strength of plus cylinder required to blur test object beyond discrimination					
	5 ft.c.		10 ft.c.		20 ft.c.	
	Meridian of greatest blurring	Meridian of least blurring	Meridian of greatest blurring	Meridian of least blurring	Meridian of greatest blurring	Meridian of least blurring
75	+0.50	+0.62	+0.62	+0.75	+0.87	+0.87
60	+0.37	+0.50	+0.50	+0.62	+0.75	+0.87
50	+0.25	+0.37	+0.37	+0.50	+0.62	+0.75
40	+0.12	+0.25	+0.37	+0.50	+0.50	+0.62
30	+0.12	+0.12	+0.25	+0.37	+0.37	+0.50
25	+0.12	+0.12	+0.25	+0.25	+0.25	+0.37
20	—	—	+0.12	+0.25	+0.12	+0.25
15	—	—	+0.12	+0.12	+0.12	+0.25
10	—	—	—	—	+0.12	+0.25
7.5	—	—	—	—	+0.12	+0.12

in the image, the value of the visual angle must be reduced to or near to the threshold of space discrimination for the eye being tested. This can be done either when the sensation difference of the object from the background is high or when it is low. If it is done when it is high, the visibility of the detail, even though the minimum discriminable size or separation of detail has been reached, is still greater than when the sensation difference from the background is low. Under the condition of low visibility, it might be expected that a smaller amount of blurring in the image would carry the detail below the threshold of discrimination than would be required under a condition of high visibility.

To test this point an artificial astigmatism was created and corrected. With both cylinders in position before the eye a distance from the test object was chosen which brought the opening in the broken circle to the threshold of discrimination when turned into the meridian of greatest blurring. For the purpose of the test this was done for black on white and for black on grays with coefficients of reflection of 75, 50, 30, 15, and 10 percent. The axis of the correcting cylinder was then displaced until the opening could no longer be discriminated. The test was made for a cylinder of 0.25 D. at intensities of illumination of 5, 10, and 20 ft.c. The results of these tests are given in table 4. From these results it will be seen that the sensitivity for the black on gray is substantially greater than for white on black.

Sometimes in refracting, the decision between the merits of two possible corrections is based on the patient's judgment as to which gives in general the clearer appearance to the letters on the chart. That test was simulated here as nearly as could be with the equipment available. This constitutes the second type of experiment referred to above. A test chart was made with the background surfaced in five sections of equal size with papers, white and gray, having the following coefficients of reflection: 75, 50, 25, 15, and 7.5 percent. On each section were printed 8 broken circles in black, coefficient of reflection 3.5 percent, subtending a visual angle of 1 minute at 12.5, 10, 8.33, 6.25, 5.55, 5, 3.33 and 2.5 meters. The opening of the circles on each background was turned in haphazard order in the eight cardinal positions. An artificial astigmatism was created and corrected. The axis of the correcting cylinder was then displaced by different amounts and the effect on the clearness of the circles on the different backgrounds was compared. This was done for three strengths of cylinder: 0.25, 0.50 and 1 D. and for three intensities of illumination, 5, 10 and 20 ft.c. The test was conducted at a distance of 6 meters. In every case there was a substantially greater blurring for the circles on gray than on white and on the darker than on the light grays. The effect was particularly noticeable for the circles of near threshold discriminability.

As was stated earlier in the paper the sensation difference between object and background can be made different either by varying the intensity of illumination and keeping the physical relation of object to background the same or by keeping the illumination constant and by using different physical relations of object to background. A very great advantage of the former is that infinitesimal changes of visibility, or of tasks set to the eye's powers of discrimination, can be made at will with the greatest possible ease and convenience when a suitable equipment is used. If every refractionist were supplied with such an equipment there is no doubt that the standard of service that would be rendered in the correction of eyes would be very greatly improved. When a fixed intensity of illumination and only one relation of test object to background are used, one of the greatest handicaps to good work in refraction is without question the lack of an adequate number of sizes and degrees of visibility in the test objects employed. In practical work the number of steps needed is limited, of course, by the strength of sphere and cylinder which are provided for the correction of defects. No such limitation, however, is present for the number of steps needed in the placement of the axis of

Table 3

SHOWING THE AMOUNT OF REFRACTIVE ERROR THAT IS REQUIRED TO BLUR TEST OBJECT BEYOND DISCRIMINATION. REFRACTIVE ERROR PRODUCED BY CREATING AND CORRECTING ASTIGMATISMS OF DIFFERENT STRENGTH AND THEN DISPLACING THE AXIS OF THE CORRECTING CYLINDER. TEST OBJECT: BROKEN CIRCLE WITH CRITICAL DETAIL SUBTENDING 1-MINUTE VISUAL ANGLE. DISTANCE OF TEST OBJECT 6 METERS. COEFFICIENT OF REFLECTION OF TEST OBJECT 3 PERCENT; OF BACKGROUNDS 75 TO 7.5 PERCENT.

Coefficient of reflection of background (percent)	Amount correcting cylinder is placed off axis to blur test object beyond discrimination								
	5 ft.c.			10 ft.c.			20 ft.c.		
	+0.25 cyl. (degrees)	+0.50 cyl. (degrees)	+1.0 cyl. (degrees)	+0.25 cyl. (degrees)	+0.50 cyl. (degrees)	+1.0 cyl. (degrees)	+0.25 cyl. (degrees)	+0.50 cyl. (degrees)	+1.0 cyl. (degrees)
75	∞*	∞	13	∞	∞	18	∞	∞	22
60	∞	25	10	∞	45	14	∞	∞	18
50	35	15	6	∞	35	12	∞	∞	15
40	22	9	3	∞	22	7	∞	32	10
30	15	5	1.5	42	15	5	∞	20	7
25	5	2	1.5	32	7	2.5	53	15	5
20	—	—	—	20	4	1.5	42	10	3
15	—	—	—	8	2	1.5	20	7	2
10	—	—	—	—	—	—	10	4	1.5
7.5	—	—	—	—	—	—	5	2	1.5

* In the above table ∞ is used to indicate that the greatest possible displacement of the axis of the cylinder did not blur the opening of the circle beyond discrimination.

Table 4

SHOWING THE AMOUNT OF REFRACTIVE ERROR THAT CAN BE DETECTED WITH DIFFERENT RELATIONS OF OBJECT TO BACKGROUND WHEN THE VALUE OF VISUAL ANGLE HAS BEEN REDUCED TO THE THRESHOLD OF SPACE DISCRIMINATION FOR THE CONDITION TESTED. REFRACTIVE ERROR PRODUCED BY CREATING A 0.25-D. ASTIGMATISM, CORRECTING IT AND THEN DISPLACING THE AXIS OF THE CORRECTING CYLINDER. TEST OBJECT, BROKEN CIRCLE WITH CRITICAL DETAIL SUBTENDING A VALUE OF VISUAL ANGLE THAT CAN JUST BE DISCRIMINATED. COEFFICIENT OF REFLECTION OF TEST OBJECT 3 PERCENT; OF BACKGROUNDS 75, 50, 30, 15, AND 10 PERCENT.

Illumination, foot-candles	Coefficient of reflection of background (percent)	Distance test object can just be discriminated with 0.25-D. cylinder and its correcting cylinder placed in same axis (cm)	Visual angle subtended by test object (degrees)	Amount correcting cylinder is placed off axis to blur test object beyond discrimination (degrees)
5	75	776	0.804	28
	50	696	0.897	18
	30	634	0.986	5
	15	—	—	—
	10	—	—	—
10	75	800	0.782	47
	50	771	0.811	35
	30	743	0.841	17
	15	657	0.952	7
	10	—	—	—
20	75	858	0.728	55
	50	826	0.757	38
	30	799	0.783	22
	15	687	0.910	15
	10	638	0.979	10

the correcting cylinder. It is in the correct placement of the cylinder that the refractionist has his great opportunity of rendering superior service and of improving his skill by the use of a better technic and equipment.

In further papers on this subject the following topics will be discussed: type of test object and some requirements of a good test object; the comparative merits of the Snellen letters, the letter E and the broken circle as test objects; a new type of broken circle and its use with variable illumination as a sensitive test for astigmatism; types of test field—illuminated, transilluminated and projected; and a projection apparatus for testing acuity.

The Wilmer Institute.

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SOURCE OF STAPHYLOCOCCI ON NORMAL CONJUNCTIVA OF HUMAN EYE

G. HOWARD GOWEN, M.D.
CHICAGO

The skin of the lower lid is found to be the source of contamination of the conjunctiva, for staphylococci are constantly being transferred from it to the lower lashes by the overlapping of the upper lash in nictitation, and thence to the conjunctiva. The author excludes the route by way of the naso-lacrimal passage. From the Department of Bacteriology and Preventive Medicine, University of Illinois College of Medicine, Research Laboratories of the State Department of Public Health and The Chicago Medical School.

It has been frequently noted that staphylococci are common inhabitants of the normal human conjunctiva[1, 2, 3, 4, 5, 6]. The predominating organism is staphylococcus albus; the citreus and aureus strains occurring less frequently. The percentage of staphylococci as compared with the total normal flora recovered is given by some observers as 93 to 97 percent[2, 4], and by others as 60 to 67 percent[1, 3]. Our observations coincide with the higher percentages reported. Investigation has revealed that in spite of irrigations with normal saline and mild antiseptics, staphylococci can practically always be recovered from the normal human conjunctival sac[7]. One observer reports the staphylococci isolated by him from the normal conjunctiva as a hemolytic staphylococcus albus and concludes that because the staphylococci from the nose also exhibit hemolysis, contamination of the conjunctiva must occur mechanically from the nose or through the naso-lacrimal duct[4]. This does not seem reasonable inasmuch as we have noted that all staphylococci may become hemolytic, an observation reported by another worker[8], and furthermore although we have instilled B. prodigiosus into the nares of both normal human and rabbit and incited severe sneezing, we have been unable to recover the test organism from the conjunctiva.

Some preliminary observations leading up to our experiments should be noted at this time. The upper eyelid is longer than the lower, has a convex border, and is the active factor in nictitation in the human. The lower lid has a flat or concave border and is relatively inactive. When the eye is closed the upper lid definitely overlaps the lower lid forcing the lashes of the lower lid down against the skin. The lower lashes are continually moist and there is a border of skin along the border of the lower lid, about one eighth of an inch wide, which is also moist. In those

subjects having staphylococcus aureus or citreus on the skin around the eye, the aureus and citreus strains can be recovered from the conjunctiva; those having only staphylococcus albus on the skin will show only the albus type in the conjunctiva.

While studying the bacterial flora of the normal conjunctiva, the constant occurrence of staphylococci, primarily the albus type, was noted. The average distribution in nineteen different specimens was

1. Upper palpebral conjunctiva	99 colonies
2. Lower palpebral conjunctiva	21 colonies
3. Lateral conjunctival fornix	17 colonies
4. Medial conjunctival fornix	43 colonies

This distribution in the human, where the nictitating mechanism of the lids is so active, differs from that in the rabbit where the eyelids rarely move. In the rabbit the greatest number of organisms is recovered from the lower palpebral conjunctiva. This relationship between conjunctival bacterial distribution and degree of activity of nictitation suggested a means of explaining the constant occurrence of staphylococci in the normal conjunctival sac.

In our experiments, the test organism used was a 24-hour agar culture of B. prodigiosus because of the ease with which this organism can be cultured and identified, and also because it is foreign to the human eye. Suspensions were made by removing one loopful of the organisms from the agar plate, using a platinum loop 1 mm. in diameter, and adding them to 5 c.c. of normal saline. Inoculations were made with sterile cotton swabs moistened with the bacterial suspensions. Cultures were obtained by using sterile cotton swabs moistened with normal saline. In all cases, the organism was recovered on plain agar plates, incubated for twenty-four hours at 37°C. and allowed to stand over night at room temperature for pigmentation interpretation.

Experiments

1. The skin along the border of the upper right and left lids was inoculated with B. prodigiosus. An area one quarter of an inch in width was used. Cultures of the upper right and left lashes were made on plain agar at five-minute intervals from five to thirty minutes inclusive. The results were as follows:

Time in minutes	*Colonies of B. prodigiosus*
5	0
10	0
15	0
20	0
25	0
30	0

This shows that the skin of the upper eyelids does not serve as a source of contamination to the upper lashes.

2. The skin of the lower eyelids was inoculated in the manner described. The purpose was to record whether the skin of the lower lids serves as a contaminant to the lower lashes. The average results of these experiments were as follows:

Time in minutes	*Colonies of B. prodigiosus*
1	Heavy growth
5	Heavy growth
10	Light growth
15	Heavy growth
20	Heavy growth
25	Light growth
30	1 Colony

3. B. prodigiosus was inoculated on to the lashes of the right and left lower eyelids and cultures made of the corresponding upper lashes. The purpose was to show whether the lower lashes would serve as contaminants of the upper lashes. The results were:

Time in minutes	*Colonies of B. prodigiosus*
1	126
5	27
15	21
25	17

4. B. prodigiosus was inoculated on the right and left lashes of the upper eyelids and cultures were made of the corresponding lower lashes with the following results:

Time in minutes	*Colonies of B. prodigiosus*
1	64
5	8
15	9
25	7

It would be well to note at this time that whereas experiments 3 and 4 in the human show that contamination from upper to lower lid and vice versa

occurs due to the nictitating action of the lids, in the rabbit where this activity is absent, no contamination occurs from one lash to the other.

5. The lashes of the right and left lower eyelids were inoculated with B. prodigiosus. Cultures were made of the lower lashes and corresponding conjunctivae. The purpose of this experiment was to show the relationship between contamination of the eyelash and the corresponding conjunctiva. The average results were as follows:

Time in Minutes	*Eyelash Colonies*	*Conjunctiva Colonies*
1	3320	157
15	89	0
30	24	0
45	6	0
50	8	0
60	0	0

Conclusions

1. Except for the influence of a factor not ordinarily present, the skin of the upper eyelid is not a source of contamination to the upper lash and plays no part in conjunctival contamination.

2. The skin of the lower eyelid serves as a heavy source of contamination to the lower lash.

3. Contamination occurs readily from upper to lower lash and vice versa, but the more rapid disappearance of organisms from the lower lash suggests a mechanical removal by the action of the upper lid.

4. As long as organisms are present on the lower lash in sufficient numbers, they can be recovered from the conjunctiva, but with the disappearance of organisms on the lower lash, conjunctival contamination ceases.

5. The fact that staphylococci are constantly present in the conjunctiva is due to the continual contamination of the lower lash by the skin, facilitated by nictitation, and mechanical introduction into the conjunctival sac by the action of the upper lid.

6. It is evident that a field devoid of staphylococci can not be obtained in the conjunctiva inasmuch as the source of contamination is always present.

I wish to express my sincerest appreciation to Dr. Lloyd Arnold, whose suggestions and criticisms proved of inestimable value.

710 South Lincoln Street.

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THE MECHANISM OF THE CROSS CYLINDER*

H. Rommel Hildreth, M.D.
SAINT LOUIS

The cross cylinder when added to an astigmatic lens system displaces the foci of both principal meridians an equal amount but in opposite directions. This is shown by casting an image from a point source of light through such lens system. The paper is an attempt to make clear what happens to rays of light as they approach the retina when using the cross cylinder as an aid to refraction. From the Department of Ophthalmology, Washington University Medical School.

The chief value of the cross cylinder lies in the fact that it offers to the patient a method of sudden or almost simultaneous comparison. Since through one side of this lens vision is improved, and through the other side vision is made worse, an exaggerated effect is produced which aids the patient in making his decisions. From such decisive steps, consequently, refraction can be very rapidly performed, and the desired end is obtained before answers become hesitant, a symptom indicating fatigue. Speed, in this sense, itself favors accuracy.

The instrument is still not in general use. This is true for the most part because the underlying theoretical background is not really understood, or at least not fully appreciated, in spite of the many excellent articles on the subject. This condition is unnecessary, for no new concepts whatever are required for an understanding. The method of manipulation is easy to acquire; but for satisfactory use, the operator must visualize the effect on the refraction with each flip of the instrument.

The literature on the subject does not contain reference to the expression "interval of Sturm" or "Sturm's conoid," yet in this principle lies the theory of the cross cylinder. As a matter of fact, in any method of refraction one should be thinking in terms of Sturm's conoid, visualizing diagrammatically the course of light rays through the tested eye. Hence the cross cylinder may be defined as an optical instrument that creates a Sturm's conoid which, when added to an astigmatic lens system, shortens or lengthens (or obliterates) the interval of Sturm of the system but which does not displace the center of the interval.

In the case of an emmetropic eye with a cross cylinder before it, light rays in one plane are brought to focus before the retina, and in the opposite plane rays are focused an equal distance behind the retina. The retina, therefore, lies at the center of Sturm's conoid. Let it be urged at each step in any method of refraction that one should consider the position of the retina in relation to the center of this conoid. If the retina is at the center, the vision will be relatively good, even though the cylinder may be fairly high. A case of mixed astigmatism measuring for a —1.00 D.sph. ⊂⊃ +2.00 D.cyl. may show 6/6 vision without the aid of the correcting lens; this vision is explained by saying that the blur circle was minimal: the retina lay midway in the interval of Sturm. It is unnecessary to say, of course, that vision is best with a point focus.

If at this point the reader will take a moment to improvise on his desk an optical bench made from his own trial set, as Dr. Edward Jackson has so often suggested, he will never forget the use of the cross cylinder, and he will actually visualize "blur circles" and "Sturm's conoids." For a point-source of light one may use a pin-hole diaphragm slipped into a trial frame, with an ophthalmoscopic light placed immediately behind it. About five inches

* Read before the St. Louis Ophthalmic Society, Nov. 24, 1933. In order to demonstrate before a large group a Bausch and Lomb micro-projector was used. The pinhole was made by perforating a piece of leadfoil which was fastened to a microscope slide. The microscope lenses were swung out of place and a +10.00 D.sphere trial lens was attached by adhesive strips. A +1.00 D.cylinder made the "eye" astigmatic and a +.50 —.50 cross cylinder when held before the instrument completely corrected the system.

from this point, place a second trial frame containing a +16.00 spherical lens. In an adjacent cell should be placed another diaphragm with an aperture of about 4 mm. Without this second diaphragm, spherical aberration will make the demonstration inconclusive. A blank paper bent at right angles will furnish a vertical screen which can be slid in and out of focus as a "retina." By adding a +5.00 D.cyl. ax. 180° to the system, one has an astigmatic "eye" (astigmatism with the rule), and the kind of error of refraction will be determined by the position of the "retina." Move the "retina" back and forth and it will be noted that at one point there is seen a vertical slit-image. At another position the slit becomes horizontal, and careful observation will show that when the "retina" is midway, the image has become a circle. This blur circle is larger than the point focus seen before the cylinder was added to the system. This arrangement now corresponds to the eye mentioned above, with mixed astigmatism, or to an emmetropic eye with a cross cylinder before it. This setting further shows why an astigmatic eye will do well with an approximately correct cylinder, since the inaccuracy of the cylindric power will be compensated for by the selection by the eye of that sphere which gives the smallest blur circle (best vision).

A cross cylinder suitable for the demonstration can be made by taping together a —2.50 D. sphere and a +5.00 D. cylinder lens. There are three facts to be determined in measuring the refraction of an eye: the sphere required, the strength of the cylinder, and finally, the position of the axis of the cylinder. All three determinations can be made with the cross cylinder. The strength of the sphere can be easily demonstrated here; but as a practical method on the trial range, this procedure seems to encourage the use of minus spheres.

Turning again to the "eye," with the "retina" at the center of Sturm's interval, let us presume that we have an astigmatic eye approximately corrected and that we wish to check the correctness of the strength of the cylinder. For simplicity of manipulation, rather than add spheres and cylinders to the set, the "retina" is moved. The "eye" has astigmatism with the rule. By holding the cross cylinder before the "eye" with the plus axis in the vertical, the blur circle becomes smaller. Reversing the cylinder causes the blur circle to become larger than the original circle and decidedly larger than that of the contrasting side. This demonstration can be very striking and shows that the astigmatism has not been fully corrected. Now suppose that the astigmatism has been corrected exactly (here by removing the added cylinder and moving the "retina" to the point focus). When the cross cylinder is placed before the "eye," one has merely created again a Sturm's conoid with the "retina" at the center, and either side of the cross cylinder produces equally "poor vision."

At this point let us analyze what many refractionists do—that is, use plus and minus cylinders separately to check the correction they have made. Adding either of these cylinders in any position moves a single extremity of Sturm's conoid, and thus lengthens or shortens the conoid which displaces its center. Displacement of the center of Sturm's interval alters the effect of the sphere; therefore it may be said that changing the cylinder alone also changes the sphere. Only by shifting simultaneously the position of both ends of Sturm's conoid can the cylindric power be changed, without altering the effective value of the combined sphere; and only a cross cylinder can accomplish this.

Lastly, let us demonstrate the action of the cross cylinder in finding the axis for the cylinder. Add to the "eye" a second +5.00 D.cyl. at about axis 75°. Flipping the cross cylinder with its handle in the 75° meridian, one sees first a smaller, then a larger blur circle. When the smaller blur circle is seen, the plus axis of the cross cylinder points toward the vertical. And finally, when the correcting cylinder axis is moved to 90°, flipping the cross cylinder makes blur circles of equal size.

The writer has followed this procedure with success in teaching the use of the cross cylinder. Because the demonstration is so striking, it is recommended to all those who have uncertainties about the value of the instrument.

824 Metropolitan Building.

EPITHELIAL CYST IN THE POSTERIOR CHAMBER

Clinical history and microscopic anatomy of the enucleated eye

CHARLES W. TOOKER, M.D.

SAINT LOUIS

The cyst in this case was traumatic in origin, the pathologic histology pointing to the implantation of epithelial cells, which proliferated posteriorly from the root of the iris or ciliary body. It was visible clinically, and transparent under transillumination. Read before the American Ophthalmological Society, in Washington, May 8-10, 1933.

Mackenzie in 1854 was the first to describe a cyst of the iris, according to A. Alt[1] who stated that "eyes in which such cysts have been observed are as a rule doomed to destruction." Many case reports of iritic cyst of the anterior chamber can be found in ophthalmic literature. Epithelial cysts of the posterior chamber, however, originating in the iris, in the ciliary body, or from implanted epithelium are apparently infrequent, for there are relatively few reports of such cysts. The following case therefore seems worthy of record.

R.B., male, aged 7 years, was brought to me on July 6, 1930, for the treatment of an injury to his right eye. An hour previously a piece of cold-cream jar had struck the eye. On examination I found a lacerated wound of the lower lid and a lacerated wound of the sclera, beginning at the limbus at about the "4-o'clock" position and extending downwards and inwards for a distance of about half an inch. The ciliary body and choroid were seen in the wound and a small quantity of vitreous was escaping. No foreign body was found within the eye. The wound of the lower lid was repaired, the scleral wound closed with three silk sutures and a conjunctival flap placed well over it. A prophylactic injection of antitetanic serum was given and, later, sterile milk injections were administered. Sodium salicylate was given for a period of three weeks. Recovery was uneventful and two months after the injury vision of the eye equalled 20/80. The left eye was normal. The patient was examined at regular, frequent intervals. On December 1, 1931, seventeen months after the injury, a small dark spot was seen just internal to the healed wound and at the iris root. It resembled an iridodialysis but the fundus could not be seen through it. Vision equalled 20/80 and the eye was "quiet." One month later the dark spot had become slightly larger and the overlying iris was grayish. He returned two months later. There had been some "watering" of the eye and vision had failed. The apparent tumor involved the lower third of the iris which bulged forward and contained irregular whitish streaks. The pupillary area was horizontally crescentic above the tumor. Details of the fundus could not be clearly seen. Coming up from behind the lower pupillary border of the iris a brownish rounded mass could be seen (fig. 1). Transillumination indicated that the tumor mass was transparent. Vision equalled 12/200 and the intraocular tension measured 17 (McLean). After consultation with Dr. W. A. Shoemaker the eye was removed. I am indebted to Dr. H. D. Lamb of the ophthalmological department of Washington University for the preparation of the sections and for his opinion regarding the nature of the tumor.

Microscopic Anatomy. The eye was of normal size. The present study of the sections was limited to the area of the cyst with these exceptions: there was

no excavation of the nerve head and the neural epithelial layer of the retina was separated from the pigment epithelial layer in several areas (fig. 2). The sections were made antero-posteriorly in the vertical plane. From many sections studied, three have been selected for description.

1. Section through the approximate center of the cyst (fig. 3). The cyst occupies the posterior chamber of the eye in its lower half, extending from the root of the iris upwards to a position above the pupillary margin of the iris. The iris is inverted at the pupillary border and the pigment layer, normally on its posterior surface, forms the anterior layer in about the inner third. There is no pigment epithelial layer on the posterior surface of the iris. The base of the iris has been destroyed. The cyst is lined on its inner surface by cuboidal and flattened epithelium in layers of varying thickness. From a point well forward on the posterior surface of the cornea and extending over the site of the iris root, over the ciliary body and over the flattened ciliary processes, it consists of two or three layers of cuboidal and flattened cells (fig. 4). It then extends over the surface of the lens almost as a single layer of flattened epithelial cells (fig. 5) to a point near the pupillary border, where the cells are again more cuboidal and are arranged in many layers. Here many of them have been compressed into squamous forms (fig. 6). Then extending peripherally to the posterior surface of the cornea this epithelial lining consists of a few layers of flattened cells. The outer covering of the cyst is formed by pigmented epithelium, but it is not a continuous envelope and varies in thickness. It be-

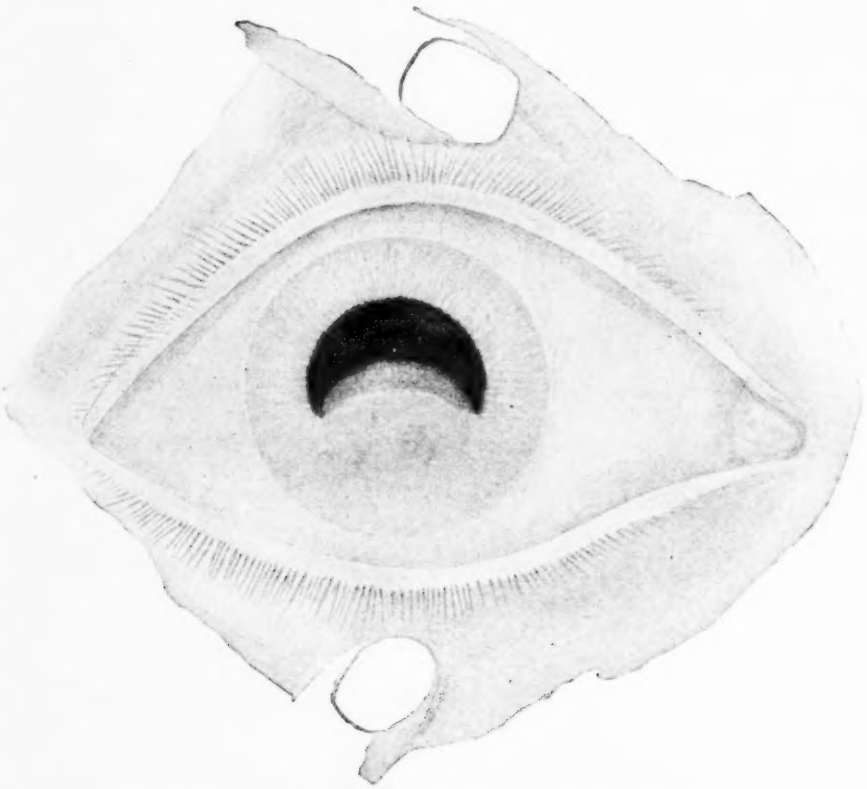

Fig. 1 (Tooker). Drawing of eye containing cyst of iris.

gins at a point well anterior to the ciliary body where the cyst has pressed the atrophied iris base against the posterior surface of the cornea. It extends centrally fusing with the pigmented layer of the ciliary body and then over the anterior capsule of the lens where it becomes very thin and interrupted in spots. Near the center of the anterior surface of the lens it is thicker and at the pupillary border it bends outwards over the anterior surface of the iris.

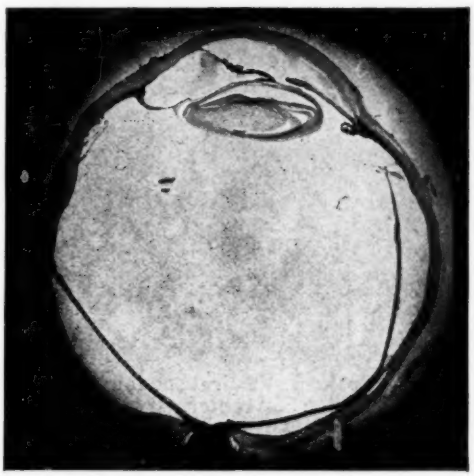

Fig. 2 (Tooker). Vertical section through eye containing cyst of iris.

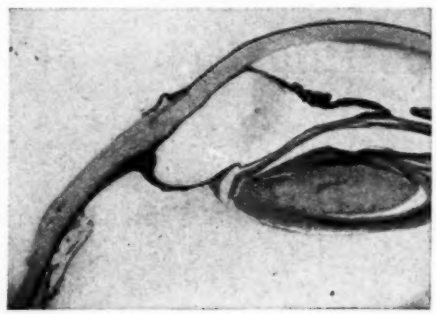

Fig. 3 (Tooker). Vertical section through approximate center of iris cyst.

There is no pigmented epithelial layer over the outer half of the anterior surface of the iris. The iris tissue between the outer pigmented epithelial layer and the inner epithelial layer of the cyst wall at the pupillary margin is infiltrated with round cells. The cyst is partly filled with serum, degenerated epithelial cells and round cells. The ciliary processes are flattened and thinned by pressure of the cyst backwards. The angle of the anterior chamber is obliterated. The anterior capsule of the lens and the anterior epithelial layer of the lens are intact throughout.

Fig. 4 (Tooker). Iris-cyst walls near root of iris and ciliary body.

2. Section somewhat lateral to the center of the cyst (fig. 7). In this section no inversion of the pupillary border of the iris is seen. The iris base has been destroyed and the iris has been torn loose from its previous adhesion to the posterior surface of the cornea. The pigmented posterior layer of the iris extends from the pupillary border to a point near the cornea where it is absent. The iris is infiltrated with round cells. The cyst projects into the pupillary

Fig. 5 (Tooker). Iris-cyst walls adjoining anterior surface of crystalline lens.

area, coming from behind the iris, but is not so intimately attached to the posterior surface of the iris. At the atrophied iris base, over the ciliary processes, and over the anterior surface of the lens, the cyst is formed of the two

Fig. 6 (Tooker). Iris-cyst walls at pupillary margin.

thin layers described in the previous paragraph. The pigmented epithelial envelope is not intimately connected with the pigmented epithelium on the posterior surface of the iris, and is absent in the outer fourth of the posterior surface of the iris. Near the pupillary border it is thick. Between the two

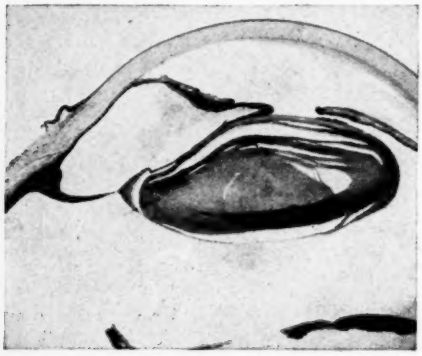

Fig. 7 (Tooker). Vertical section of cyst of iris lateral to its center.

epithelial membranes forming the cyst wall near the ciliary body, connective tissue fibers are seen (Van Gieson's stain). This figure (7) probably represents a section through a fold of the iris.

3. Section farther from center of cyst (fig. 8). In this part of the cyst, its superior border has not risen above the pupillary margin. The base of the iris is atrophic and has been pressed against the cornea, obliterating the chamber angle. The pigmented layer of the iris is continuous and fused with the cyst wall. The two enveloping walls of the cyst are almost complete and between them

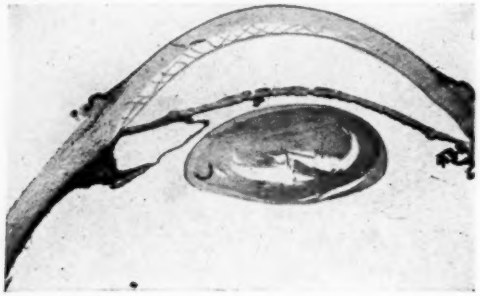

Fig. 8 (Tooker). Vertical section of cyst of iris distant from its center.

in some areas are found connective-tissue fibers, round cells, and elongated cells resembling fibroblasts. From the inner lining of the cyst near the ciliary body, tufts of cuboidal and squamous epithelial cells project into the cavity of the cyst. This figure (8) probably represents a section through a lateral extension of the cyst above the iris base.

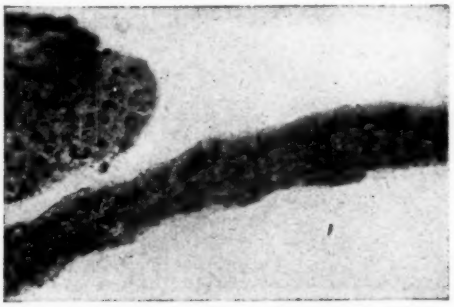

Fig. 9 (Tooker). Bleached section of walls of iris cyst.

Bleached sections (fig. 9) were studied to determine the type of epithelial cells forming the cyst walls. On the under surface of the iris and at the pupillary border, where there was less pressure than elsewhere from the growth of the cyst against resistant

structures, the cells of the pigmented epithelium were polygonal and columnar. The cells of the inner epithelial lining of the cyst were of the polygonal and squamous type.

Comment. Clinically the tumor resembled closely a cyst formed by a separation of the two epithelial layers on the posterior surface of the iris, described first by Treacher Collins[2] in 1890. Stephenson[3] in his report of a similar case wrote that "in brief it seems tolerably safe to assume that enucleation will be the ultimate fate of many of the eyeballs affected with uveal cyst." In the present case an operation for the evacuation of the cyst or for its removal was considered but such procedures were thought to be of doubtful benefit. The condition of the interior of the eye was unknown, vision was greatly impaired, and the previous injury in the ciliary region made the eye readily susceptible to recurring inflammation and final loss following such an operation, even if it were possible to remove the cyst completely. A study of the sectioned eye did not confirm the clinical opinion that the cyst was formed by a separation of the neural epiblastic layers of the iris. Near the pupillary border, iris tissue was present between the inner epithelial lining of the cyst and the outer pigmented epithelial covering. The fluid and cellular contents of the cyst were within the inner epithelial covering of the cyst and not between its two coverings. A case of somewhat similar appearance clinically was reported to this Society by Wilmer[4] in 1928. This cyst was transfixed and a useful eye was retained. His report included an excellent bibliography.

Analogous to this kind of iris cyst is the type of cyst described by Collins and Mayou[5], formed by a separation of the two epithelial layers lining the ciliary body. They state that "these cysts have an outer wall of pigmented cells and an inner wall of unpigmented cells." The terms "outer" and "inner" probably refer to the outer pigmented layer at the ciliary body and the inner nonpigmented layer projecting into the posterior chamber rather than to complete coverings of the cyst. The areas of retinal detachment seen in figure 2 rather suggest such a mode of cyst formation. Brailey[6] in a study of sections of iris cysts refers to two other methods of formation of cysts of the pars ciliaris retinae: 1. A proliferation of the inner nonpigmented epithelial cells of the ciliary body may occur and a cyst form in the center of the proliferated mass. 2. A cyst might arise by multiplication and union of the epithelial cells of adjacent portions of the ciliary body. The outer wall of these cysts would then be formed by both layers of epithelium. The microscopic anatomy of the cyst here recorded is not easily explained by assuming a spontaneous cystic growth from ciliary epithelium. The implantation theory is the usual explanation for the development of iris cysts and with the history of a previous injury in this case such a theory is the obvious explantation. Fuchs[7] states that "we have as yet no certain explanation for the development of iris cysts except for the ordinary kind, namely the traumatic cysts." This theory does not, however, adequately account for all the pathologic anatomy seen in the sections. If epithelium were implanted in the posterior chamber at the time of the injury it could develop into a pearl tumor and later become hollowed out by degeneration of its center, or it could spread by extension over the walls of the posterior chamber. Such a development would not, however, explain the outer pigmented covering of the cyst wall. If epithelium were implanted at the iris root or in the ciliary body, the presence of pigmented epithelium on the anterior surface of the lens capsule and the inversion of the pigmented layer of the iris at the pupillary border could be explained by assuming that the developing cyst pushed the pigmented epithelial layer of the iris ahead of it and partly stripped it from the posterior surface of the iris. As the cyst continued to grow, this detached pigmented epithelial layer may have been pressed backwards against the lens. The enlarging cyst could readily have caused an inversion of the pupillary border of the iris, after the posterior epithelial layers of the iris had been torn from the iris

base. More difficult of explanation is the presence of a pigmented epithelial layer coating the posterior surface of the cornea at the site of the chamber angle. The case reported by Roth and Geiger[8] resembles in some respects the case here presented. In 1911 the patient's right eye was perforated at the sclerocorneal junction by a piece of lead pencil. In 1924 "oblique illumination showed the iris at '5 o'clock' bulging up and in contact with the under surface of the cornea. . . . A small irregular tumor mass could be seen at the pupillary margin." The report from the pathologist was "a multilocular cyst which lies between the posterior surface of the iris and the ciliary body. . . . The inner lining of the cyst consists of several layers of flattened squamous epithelium. . . . The pigment layer of the iris covers the entire cyst."

The hypothesis has been expressed by Oatman[9] that these cysts are formed by an extension of epithelium into the eye from the site of injury. A careful study of many sections of the eye in the case here reported failed to demonstrate any ingrowth of epithelium connecting the area of the injury with the posterior-chamber cyst.

Summary. Seventeen months after a penetrating wound in the ciliary region of the right eye of a boy, a tumor developed in the posterior chamber. It was visible in the pupillary area coming up from behind the iris. The eye was removed and sections made from it. The tumor was an epithelial cyst of the posterior chamber. The explanation of the development of the cyst that is most consistent with the clinical history and the pathologic anatomy, is the supposition that at the time of the injury epithelial cells were implanted at the root of the iris or in the ciliary body, and that they proliferated forming a cyst which extended into the posterior chamber.

1006 Carleton Building.

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Discussion. Dr. E. V. L. Brown, Chicago: I would like to ask if the sections made were serial sections. Dr. Tooker states that many sections were studied. The pictures show little concerning the nature of the wound in the sclera. It could have been extremely small and still have resulted in the condition shown in the illustration. In this connection I would make a plea for more serial sections of eyes. Clinically, no one would study the upper or lower part of the cornea and disregard the rest, so why should we study just a few sections of a globe that pass through the pupil and disc and omit sections through areas above or below, or anywhere?

Dr. E. C. Ellett, Memphis, Tenn.: I have a case that has some points in common with this case that Dr. Tooker has reported.

Mrs. B. H., aged thirty-two years, was seen October 10, 1930, with the history that the vision in the right eye had been poor since she was five years old, at which time the eye was cut by a knife. The patient stated that for the last two or three months the vision had been worse; the eye was sensitive to light and there were occasional sharp pains. Vision equaled 6/20. There was a scar from the center of the cornea to seven o'clock. Underneath this scar was an atrophic area of the iris 6 mm. in

diameter. The iris touched the cornea down and out, but elsewhere the anterior chamber was of normal depth. Behind the pupil, down and out, a smooth brown tumor was visible, which appeared to press the iris forward and the lens backward. The eye, including the tumor, was clear to transillumination. The tension was 13 mm. Hg Schiötz, the fundus was normal.

A diagnosis of melanotic sarcoma was made and enucleation advised, The growth was removed through a keratome incision, and one week later the eye was practically healed, with a vision of 6/30 with glasses. The patient has not been seen since a week after the operation, but she reports no further trouble with the eye. There follows a pathologic report from the Army Medical Museum.

"Microscopically, the tissue consists of fibrous tissue which in one part of the section is loose, myxomatous, and contains masses of melanin. The broader end or base of the triangular specimen is composed of rather dense fibrous tissue in which there is a suggestion of beginning cartilage formation. Strands of this fibrous tissue surround structures resembling the ciliary processes, though much atrophied. These strands appear to form cysts lined by epithelium of the type seen on the ciliary processes. There is practically no inflammatory reaction. The mass suggests an edematous organizing process involving the ciliary processes and replacing exudate. The masses of pigment included in the organized tissue may represent part of the iris, or may have come from further back. There is nothing suggesting a true neoplasm or tumor."

Dr. Charles W. Tooker, closing: In answer to Dr. Brown's question, serial sections of the eye were not made by the laboratory.

SARCOMA OF CHOROID IN A SHRUNKEN GLOBE EXHIBITING FIBROUS FORMATION ABOUT THE TUMOR

BURTON CHANCE, M.D.
PHILADELPHIA

After a blow on the side of the head, the eye on that side became red, inflamed, and later very painful and hypertensive. This was followed after a year of unremitting pain by hypotension and shrinkage of the globe. For three years the pain continued and the patient finally consented to excision of the globe. The sections presented evidence of sarcoma of the choroid with fibrous tissue in contact with the growth, forming an enveloping capsule. The patient died of an abdominal tumor, clinically diagnosed carcinoma of the uterus, four years after the eye had been removed. Read before the American Ophthalmological Society in Washington, May 8, 1933.

Early in May, 1925, a woman, fifty-odd years of age, consulted me because of pain in a long-diseased left eye. She stated that, on a certain day, three years previously, while trying to fasten a heavy window shutter, which was being battered about in a high windstorm, she was struck on the left side of the head bruising her temple. A few days later, the eye became red, as though from hemorrhage, and inflamed. The inflammation persisted and, several weeks after, excruciating pain set in, from which in all the succeeding months she had not been free. She consulted an oculist, who advised an operation, but his advice was rejected; her later visits to him were quite irregular and, chiefly, that she might be relieved of pain. No special symptoms had developed in her right eye.

On examination, I found a much shrunken globe, the cornea of which was blood stained, and, in the deep anterior chamber was a stratified hyphema, the top layer being quite fresh. Projecting into the distended pupil of an atrophic iris was a calcareous lens. The eye was exceedingly tender. Immediate removal of the globe was advised. Three days later she returned, stating that the pain of the night before had been so excruciating that she would have the globe removed.

The globe was excised in the afternoon. As the woman would not submit to general anesthesia, I began, after a maximal dose of morphine and atropine, hypodermatically, and injections of solutions of novocaine, deep into the orbit. These measures, however, were not sufficient, so ether inhalations were forced upon her, which enabled me to complete the operation without accident. The hemorrhage was quite profuse yet coagulation followed quickly. When visited two days later, I found her out of bed and clothed, being fully recovered, and so revived that she desired that she might return to her home where she had many household responsibilities. There was a good clean socket, though a little edematous, and the stump was movable; the gaping tissues had been united at the time of the operation with five sutures which were removed on the ninth day.

On the fourteenth day the patient resumed her housekeeping. She did not return until the middle of August, having had great general comfort with increased good health. She desired a glass eye; she was a difficult person to satisfy, and, as she selected one from a general stock, none could be moved comfortably. At last a reform model pleased her; I did not see her again after September, 1925. Later, I learned that the woman had died of malignant disease in her abdomen, January 31, 1928. A note from her sister, March 8, 1929, stated that the patient had died of cancer of the stomach about four years after the removal of her eye.

Dr. Sydney L. Olsho, under whose observation she had been from April 1, 1922 to 1925, most kindly has sent notes of her case. The sight of the left eye had been lost for six months, prior to her consulting him, and for five days the eye had been very sore. The cornea was found to be steamy; the iris more or less atrophic and the lens cataractous, which prevented a view of the fundus. The tension was high. The right eye was healthy, but compound hyperopia

was present, the astigmatism measured by a 4.50 cylinder.

By June the eye had become quiet and soft. In July of the next year, 1923, pain was again recorded. The conjunctiva was edematous and the sclera greatly congested. In the next month the injected globe had become soft; the iris degenerated and numerous synechiae attached it to the densely cataractous lens. In September, sixteen months after the original incident, the eye began to shrink, and was very painful, yet the patient could not be induced to consent to its removal. When she was seen for the last time by Dr. Olsho, in March, 1925, the globe was markedly shrunken.

Dr. Thomas J. Fleming has given me an account of his attendance upon the woman. The presumptive diagnosis was "Carcinoma of the uterus involving the visceral peritoneum," based entirely upon clinical study, as no post-mortem examination was permitted him. He had found a palpable mass in the pelvis eighteen months before death. The patient had had vague symptoms for six months. In the succeeding fourteen months there was a gradual enlargement of the mass, it having become the size of a baby's head. Adjacent to it were four other irregular masses, as large as oranges; all could be felt easily through the abdominal walls. Dr. Fleming was inclined to regard the slowness of the growth of these masses as indicative of a carcinomatous process rather than that of a sarcomatous.

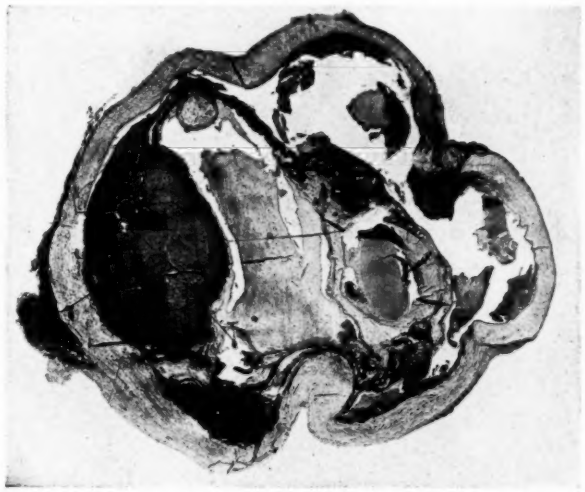

Fig. 1 (Chance). Section showing shrunken globe with tumor.

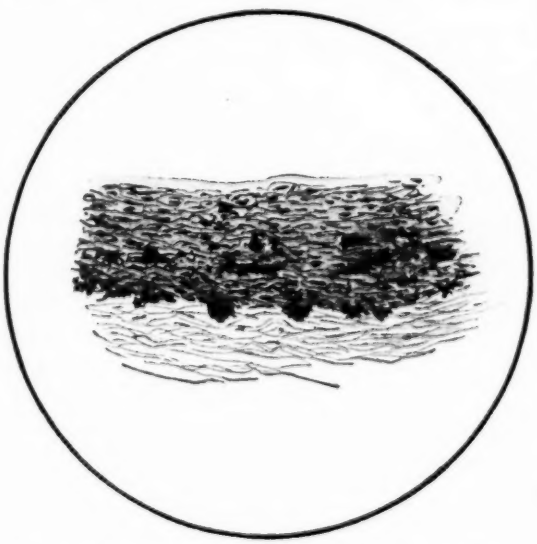

Fig. 2 (Chance). Section of band limiting tumor.

The pathological studies of the excised eyeball have yielded the following details: The globe was quadrate, with rather deep sulci. There were no signs of anything extruding through the sclerotic walls or along the nerve stump. It was entrusted to Dr. De Long, pathologist of Wills Hospital, who, later, in November, 1928, informed me that the section of the globe disclosed a sarcoma in the choroid. It is because of so rare a finding within a phthisical globe, that the case is presented to you today. An earlier presentation of this report has been hindered by difficulty in obtaining from the sister of the patient the names of those who had been in attendance upon her; and the histologic studies have been unavoidably delayed, because the specimen and the

records had been mislaid until a few weeks ago.

In the meantime several slides were sent to Mr. Treacher Collins, who received them at the time he was writing his paper on "Formative fibrous tissue reaction in the eye," for presentation at the 1929 session of the Ophthalmological Society of the United Kingdom.[1] He wrote to me that, before receiving my slides, he had not had a specimen of a choroidal sarcoma in a shrunken globe, and, in his studies of the sections sent, he had discovered fibrous tissue in contact with the growth which had formed a kind of enveloping capsule. In a drawing Mr. Collins depicted the fibrous-tissue capsule covering the growth. The reproduction of the illustration I am allowed to place in my report through the courtesy of the Society.

Fig. 3 (Chance). Section showing connective tissue and osseous bands.

In the more recent studies of the sections, during which I was greatly helped by Dr. De Long, to whom I am most grateful for valuable comments, the histologic features noted were as follows:

The globe had become so distorted that it no longer resembled a human eyeball. The cavity contained much blood and exudations but without visible cicatricial fibrous bands which by contraction could have produced the distortion. Also, a dense pigmented area in the posterior section, presumably a tumor mass, occupied approximately one third of the scleral cavity. It had its seat in the choroidal tissues.

The corneal cells were much disarranged and exhibited signs of a superficial epithelial inflammation as though it were an extension from a conjunctivitis. Bowman's membrane was quite irregular and the lamellae markedly separated in several areas; a number of well-formed blood vessels pervaded the stroma. The endothelium was intact but had become much contracted. The aqueous cham-

Fig. 4 (Chance). Section of sarcoma showing limiting band of connective tissue.

ber contained degenerated blood and the products of exudation. The iris and ciliary body were atrophic and presented signs of plastic exudation on the surface as well as proliferative changes in their substance. The exudative products in this region had undergone extensive osseous formation. The retina was much degenerated and the exudative sheets had united with the iris and ciliary body and all had surrounded the degenerated lens.

There were signs of exudation in the choroid, and the fibrous formation, described by Mr. Collins and more extensively studied by ourselves, was seen to have taken its origin in this exudative material, the proliferation from which had extended until it surrounded the tumor mass. In the fibrous formations could be seen degenerated melanotic elements and certain of the fields showed, in the midst of fibrous sheets, islands of tumor cells. The vascular elements presented nothing unusual; neither were there among the hemorrhagic deposits evidences of their metamorphosis into sarcomatous elements; such a transition was believed to have occurred in certain of the similar cases reported in the literature.

The tumor was composed of spindle and small round sarcomatous cells. Here and there in the plane of the sections were areas which did not take the stains, indicating that in such areas necrosis of the cells had occurred. There were but few blood vessels, most of those seen being of recent formation. There was but slight pigmentation of the tumor tissues, and what was present was of the type derived from the uvea rather than from the blood.

Shrinkage of the globe supervening upon sarcoma has been wellknown in the literature. The cases have been classified into those in which the shrinking supervened upon the sarcoma; another group in which phthisis preceded the development of sarcoma; and a third in which injury might be considered to be the cause of the choroidal sarcoma[2].

Leber and Krahnstöver, by 1898, had collected thirty-four examples[3], in which shrinkage was found to be due to the development of fibrous tissue in plastic inflammatory exudation as the results of chronic uveitis.

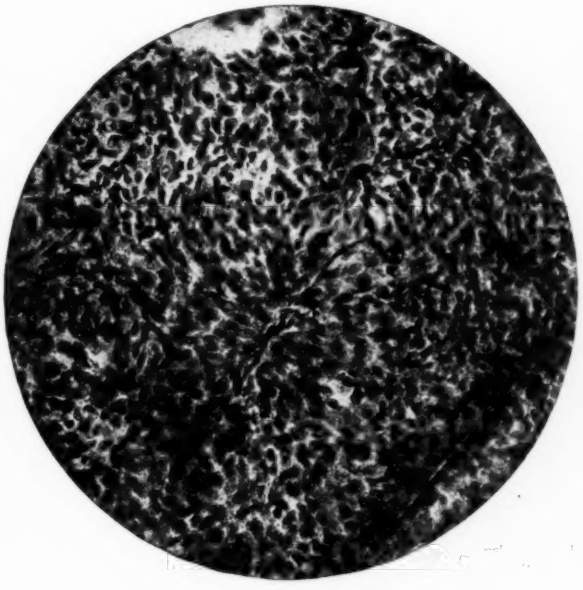

Fig. 5 (Chance). Section of sarcoma showing denseness at border.

In certain of the reports it was observed that in cases in which fibrous tissue developed there was no shrinkage of the globe; in others, although the iris, the retina, and the choroid were but little altered otherwise, necrotic changes more or less extensive were found in the sarcomatous mass.

In many respects, the history of my case might be considered in the light in which Leber, at the Heidelberg Congress in 1898[4], spoke of the occurrence of phthisis bulbi in cases of intraocular tumors. He stated that although it had long been known that tumors might grow in eyes already phthisical from disease or injury, he would call especial attention to the fact that occasionally it has been noticed that eyes which contained a tumor had become phthisical and, for a time, the tumor itself ceased

to grow. He pointed out that such eyes were not those in which the tumor had perforated the globe and then proliferated so luxuriantly externally as to compress the globe and the neoplasm within it, but rather were they cases in which an internal inflammation had led to phthisis, and, consequently, to a temporary cessation in the growth of the tumor. Leber ascribed this occurrence to a necrosis of the tumor itself, which led to inflammation in the neighboring tissues. He looked upon the changes as not merely the death of the tumor cells, but rather as a necrosis of a whole lobe, or of nodules, of the growth. It, therefore, would not be surprising to note that all this should be followed by severe inflammatory reaction in adjoining tissues. Leber did not attempt to decide whether this necrosis was induced by mechanical causes or by infective microorganisms.

In a study of my case the following points present themselves: There was the assertion by the patient and her sister that the left eye had been healthy with visual power equal to that of the right, until the woman was struck on the side of the head by the window shutter, following which the eye became red, as though blood had filled the chamber, and soon after, it became violently inflamed. After a few months, pain set in and for the remainder of the time continued without remission, except in exacerbations as though from an increase in the contents of the eye. In the early stage the eye was in the state of hypertension which was followed a year or so later by hypotensiveness and shrinking. The case did not present marked signs of disease of the anterior segment; although there had been a plastic iritis, the cornea continued free from ulceration and signs of purulency of the uvea were not observed.

The presence of osteoblasts in the cyclitic membrane is of so unusual occurrence that it might be considered to be one of the special elements in this case and to be taken along with the development of fibrin as a contribution to the forces which hindered the extension of the sarcoma beyond the boundaries of the eyeball. In conclusion, we might regard this case as one in which an unsuspected neoplasm had rested quiescent until a traumatism had excited it into activity, yet that activity was checked by the excessive fibrosis ensuing from exudation in the uveal tissues; the pathological sequence terminating in the shrinking of the globe.

315 S. Fifteenth Street.

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NOTES, CASES, INSTRUMENTS

AN INSTRUMENT SIMPLIFYING THE INSERTION OF CORNEO-SCLERO-CONJUNCTIVAL SUTURES IN OPERATIONS FOR CATARACT*

F. H. VERHOEFF, M.D.
BOSTON

In 1927 I described a new type of sutures in operations for removal of cataracts. The sutures include corneal, scleral, and conjunctival tissues, and give firmer and more precise closure of the wound than any other type of sutures yet devised. Several methods for inserting the sutures were described. That recommended for a single suture was relatively simple, but those for two or more sutures were difficult and time consuming. For this reason I employ multiple sutures only in cases in which the patient was subject to attacks of coughing or vomiting. Noting, however, that in not a single case in which I inserted two or three sutures did postoperative prolapse of iris or vitreous occur, and that when loss of vitreous occurred at the operation the wound always remained firmly closed, I decided that it was my duty to insert at least two sutures in all cases. For over a year, therefore, I have employed two sutures routinely, and the results have continued to be uniformly successful.

Recently I devised and constructed an instrument that makes the insertion of the corneo-sclero-conjunctival sutures so simple that in my opinion no operation for senile cataract should be now performed without the use of two or more such sutures.

The instrument serves to hold the lips of the wound close together and to support them without endangering the eye while the needle is passed through the cornea and sclera. It consists of a shaft 1 mm. in diameter, at one end of which is a sliding piece bearing three steel needles (fig. 1). By means of a spring the cornea and sclera can be clamped between the footplate and the sliding piece. For a short distance from the footplate the shaft is flat and thin (.4 mm. in thickness), so that when inserted in the wound it does not separate the lips to an important extent. The sliding piece is slotted to fit firmly on this part of the shaft and yet be freely movable up and down. The end of the sliding piece is slightly concave and the needles, 2 mm. apart, project from it each about .6 mm. Two of these are to engage in the sclera, the other in the cornea. There is a stop on the instrument to prevent the needles from touching the footplate. The sliding piece has a small lateral arm in the form of a right angle. The third needle projects from this to engage in the sclera. The lateral arm and this needle, when the suture-needle is being passed, serve to hold the sclera in place. The footplate is rectangular in shape, 2.5 × 4.5 mm. in size, and slightly concave on its upper surface. When inserted through the

Fig. 1 (Verhoeff). Instrument with jaws open ready to be inserted in wound. Actually the jaws are kept closed by the spring until opened by the fingers.

* From the Howe Laboratory of Ophthalmology, Harvard University, and the Massachusetts Eye and Ear Infirmary.

wound it forms a shelf 1 mm. wide beneath the sclera, and 1.25 mm. wide beneath the cornea. It projects about 3 mm. on one side to support the cornea while the suture is being inserted. Other details of the instrument can best be ascertained from the illustrations.

By the aid of this instrument any number of sutures may be inserted, but

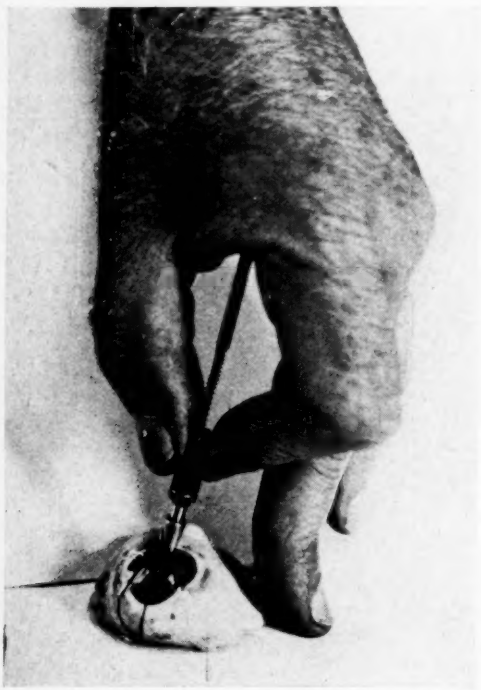

Fig. 2 (Verhoeff). Method of holding the instrument when it is being inserted or removed. Pig's eye. In the operation upon a human eye, the hand is supported by the brow of the patient.

two are sufficient. A conjunctival flap is first dissected back from the limbus where the incision is to be made. The margin of the conjunctiva should be cut exactly at the limbus to avoid any possibility of a tag of conjunctiva later becoming inverted into the wound and thus causing epithelialization of the anterior chamber as sometimes happens after some other methods. The incision is now made in the usual way, preferably exactly at the limbus. The knurled sleeve on the sliding piece of the instrument is grasped between the thumb and first finger of the left hand and pulled up by holding against the metacarpal-phalangeal joint of the index finger the knob on the upper end of the instrument (fig. 2). The footplate is passed into the anterior chamber at the site selected, and brought against the cornea and sclera. The sliding piece is then slowly released, thus clamping the lips of the wound. In carrying out these procedures care should be taken not to displace the lips of the wound laterally from their natural relative positions. The first suture is now to be inserted; No. 1 black silk thread about 35 cm. in length, armed with two curved needles is employed. The knob of the instrument is released and the latter held firmly in a comfortable upright position (fig. 3). One needle is entered in the cornea between the body of the end piece and its arm, about .75 mm. from the edge of the wound, passed through

Fig. 3 (Verhoeff). Method of holding the instrument when the suture is passed through cornea and sclera.

the corneal stroma at a depth of about one-half the corneal thickness, then through the sclera for a distance of about .5 mm. In doing this it is best first to push the point of the needle from the cornea out of the wound a fraction of a millimeter so as to ascertain the position of the point, and then to pass the needle through the sclera. It is impor-

tant, of course, not to pass the needle entirely through the cornea or sclera into the anterior chamber. As the needle is passing through the sclera it is pointed upward so that the pressure on the sclera is resisted by the small projecting arm of the instrument. The instrument is then removed from the eye, and each of the needles is passed through the conjunctival flap from beneath, the upper needle about 3 mm., and the lower about 1.5 mm. from the cut edge (fig. 4). The instrument is then again introduced in the eye at a different place and a second suture inserted. The two sutures should be about 4.5 mm. apart. An iridectomy, if desired, is now done, and the iris replaced. With a spatula each suture is pulled out from the wound and the loops thus obtained placed one on each side, out of the way (fig. 4). The cataract is now removed by any method preferred. I al-

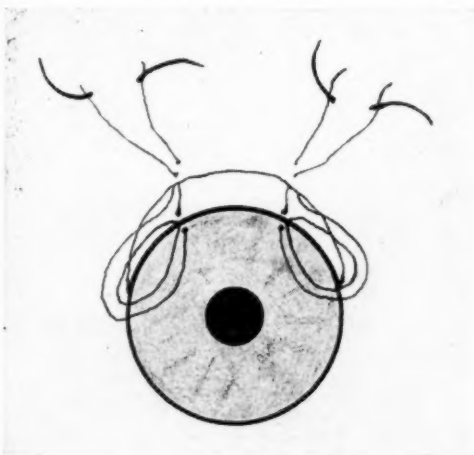

Fig. 4 (Verhoeff). Diagram showing conjunctival flap and sutures preparatory to the removal of the cataract. The threads should, of course, be much longer than here shown, and their ends are placed on the top of the patient's head.

ways employ the method described by me in 1927[2], and almost invariably succeed in removing the lens in its capsule. If the patient has a prominent eye and is a "squeezer," the capsule forceps are removed as soon as the lens begins to emerge, pressure on the cornea is then resumed, and as the lens is expressed one of the sutures is pulled tight. In this way loss of vitreous may sometimes be avoided when otherwise it would be inevitable. Each suture is tied by a "granny knot" and only with sufficient tension to take up the slack. They later become tighter owing to the swelling of the tissues, and never become loose or untied (figs. 4 and 5). After the sutures are tied, the margin of the flap

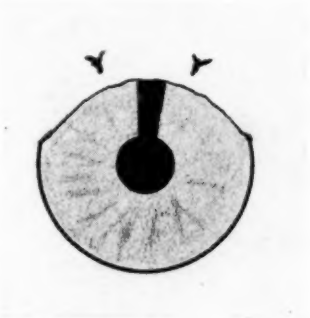

Fig. 5 (Verhoeff). Diagram showing conjunctival flap in place and sutures tied at completion of the operation.

should be grapsed by smooth forceps and gently pulled upon, especially at the site of each suture, until it is in perfect position. I have always found the flap in perfect position the next day.

In removing the instrument it is grasped as when it was inserted, and it is best first to push the cornea forward with it until the footplate is free from the sclera. If desired, a loop of the suture may be pulled out by the footplate when removing the instrument.

The eye may be inspected at any time after the operation without danger of reopening the wound. I inspect it the next day, and always find the anterior chamber reformed. On a few occasions I have inspected it a few hours after the operation and even then have always found the anterior chamber reformed. The patients complain of little postoperative pain, often they have none. This is probably attributable to the fact that the anterior chamber is reformed before the anesthesia has worn off.

I generally remove the sutures on the eighth day, but in the case of an uncooperative patient they may be allowed to remain two or three weeks.

The sites of the sutures are anesthetized by a 20-percent solution of cocaine applied for about thirty seconds by cotton-tipped toothpicks. The knots are cut with scissors; it is important for the latter to be sharp at the points. The sutures are then picked out with forceps. If this is found difficult, the sutures may be allowed to remain after cutting of the knots. The ends of the sutures should never be grasped with forceps before cutting the knots, as the patient might break open the wound by

Fig. 6 (Verhoeff). Model of the instrument with different spring mechanism which some operators may prefer.

a sudden movement of the eye. I find the removing of the sutures is the most annoying part of this technic.

The needles I have employed are Berbecker (No. 6, 3/8 circle). These have proved sufficiently satisfactory, although needles with smaller eyes would no doubt be preferable. Finer needles are apt to be too flexible. In inserting the sutures it is best to bring the needle out of the cornea close to the outer surface of the latter and then to enter it close to the inner surface of the sclera. This will cause the sclera to override the cornea slightly and thus tend to reduce postoperative astigmatism. I have found the latter less after the use of two than after the use of a single suture.

The instrument may be sterilized by boiling water, but I prefer simply to immerse it in 95 percent alcohol for five minutes or longer. Care should be taken not to allow blood to coagulate upon it. Immediately after use it should be rinsed first in water or boric acid solution, then in 95 percent alcohol.

It might be thought that the use of sutures would increase the danger of infection. As a matter of fact, I have never lost an eye from infection in any case in which I employed two sutures. No doubt this is due to the firm closure of the wound, and the protection afforded by the large conjunctival flap. In a few cases in which I have employed a single suture, purulent exudate has formed about it, but this infection has been promptly checked by the topical application of 10 percent mercurochrome solution, which readily soaks into the path of the sutures.

In the model of the instrument just described the jaws are held shut by a spiral spring which is pulled up to permit the insertion of the footplate in the wound, and then released. For me this manipulation has presented no difficulty, but Dr. Z. W. Colson of the Massachusetts Eye and Ear Infirmary suggested that other operators might prefer a more familiar mechanism, analogous to a forceps, and he proposed the use of two curved flat springs. I therefore had a model of the instrument made which incorporates such a mechanism (fig. 6). In this the action is opposite to that of the original model; the jaws are held open by the springs and kept closed by continued pressure of the fingers. An advantage of this model is that the grasp used in inserting the instrument is not changed when the suture is inserted and when the instrument is removed. I have found that this model works in a satisfactory manner, but I still prefer the original model because of its simplicity and lightness, and because no finger pressure to close the jaws is needed while it is held in proper position for the insertion of the

sutures. However, each operator should decide for himself which model he can manipulate to better advantage*. Several other possible modifications of the instrument have occurred to me, one of them a catch to hold up the spiral spring during the inserting of the instrument. No doubt it would even be possible to devise a mechanism which would convert the instrument into an actual automatic sewing machine. Perhaps these modifications should be tried, but it seems likely to me that their advantages would be offset by the simplicity of the present model.

243 Charles Street.

* Either of these models can be obtained from The Crompton Machine Company, Broadway, Lawrence, Massachusetts.

References

[1] Verhoeff, F. H. A corneo-sclero-conjunctival suture in operations for cataract. Trans. Amer. Ophth., Soc., 1927, v. 25, p. 48.

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SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

SAINT LOUIS OPHTHALMIC SOCIETY

April 28, 1933

Dr. M. W. Jacobs, president

Abducens paresis

Dr. Charles W. Tooker reviewed the origin and course of the abducens nerve. He then enumerated the following conditions as being the most common causes of paralysis: 1. Injuries to the base of the skull with accompanying hemorrhage. 2. Nuclear lesions; caused by syphilis, acute infectious disease (especially diphtheria), disorders of metabolism (especially diabetes), poisoning by alcohol, lead, carbon monoxide gas, and diseases of the central nervous system, particularly multiple sclerosis. 3. Lesions affecting the intracranial portion of the nerve, such as inflammation of the meninges; neoplasms, edema, infections in the petrous portion of the temporal bone, aneurysm, occlusion and rupture of vessels, sinus thrombosis. 4. Lesions in the orbit; tumors, injuries, inflammation in the orbit or its vicinity, especially in the accessory nasal sinuses.

Dr. Tooker illustrated these causes by reading the case reports of seven patients.

Discussion. Dr. Meyer Wiener defended the diagnosis of toxic sixth nerve paralysis and described five cases in which this diagnosis was made. All recovered completely although the sixth nerve paralysis lasted a long while.

Dr. W. F. Hardy traced the anatomical course of the sixth nerve in an effort to explain symptoms associated with sixth nerve paralysis. He showed that the most vulnerable part of the nerve probably lay between the petrous portion of the temporal bone and the posterior clinoid process.

Metastatic iridocyclitis due to gonorrhea

Dr. E. C. Spitze reported the case of a young male adult with a specific urethritis complicated by an extremely severe anterior uveitis. External signs were slight, and photophobia was the most striking feature. With other forms of therapy, foreign proteins were used. Temperature elevation was secured with difficulty, but when this reached 103°F. improvement was secured.

Discussion. Dr. C. J. Gissy brought up the question of considering the uveitis as a manifestation of systemic intoxication, rather than as a metastatic affection, but he believed that the case resembled the mestastatic gonorrheal conjunctivitis with secondary keratitis and iridocyclitis described by Byers.

Dr. H. J. Howard stated that in nonspecific protein therapy since the fever reaction was the important factor rather than the type of protein used, and since the doses of typhoid vaccine could readily be gauged and given in rapidly increasing doses with a rather accurate predetermination of the fever reaction, he had come to the conclusion that typhoid vaccine administered intravenously was of greater therapeutic value in the treatment of gonorrheal ophthalmia than milk. He stated that the gonococcus was highly sensitive both in vitro and in vivo and did not grow at temperatures above 102.2°F. He mentioned several cases showing a rapid disappearance of gonococci from conjunctival scrapings following induced fever. He suggested the induction of fever in gonorrheal ophthalmia cases at least twice and perhaps as many as four times in succession.

Dr. John Green spoke of the inadvisability of prostatic massage in cases of gonorrhea complicated by eye infections because of the danger of a flare-up of the eye condition.

Dr. R. E. Mason pointed out the frequency, in his experience, of a chronic infection of the genito-urinary tract serving as a point of focal infection for chronic uveitis.

Howard C. Knapp,
Editor.

COLORADO OPHTHALMOLOGICAL SOCIETY

May 20, 1933

Dr. O. C. Wise presiding

Retinal detachment and choroidal tuberculosis

Dr. C. E. Earnest presented the case of I. V., Mexican aged 27 years, who was first seen on September 17, 1933. At that time the complaint was loss of vision of the left eye. There was a history of active pulmonary tuberculosis in the left chest since 1929 and a probable hip tuberculosis. Examination revealed a detachment of the retina, involving the macula and one-third of the temporal retina. There was a bright red area about 1 mm. in diameter at the outer margin of the detachment. The anterior segment and the tension were normal. Vision of the right eye was light perception in the temporal field, vision of the left eye 20/20. The physical examination showed general active miliary tuberculosis of both lungs. The blood count, blood Wassermann, and urine were negative.

The patient was kept at rest at home and placed under the care of an internist. The pupil was kept dilated with atropine. Under this régime the general condition gradually improved without change in the eye.

The patient left Pueblo for a month during the winter and on returning his pulmonary tuberculosis was found to have become worse. There was fever of 101° to 102° F. in the afternoons. The patient was again put to bed and kept under general treatment. Since that time his general condition had gradually improved but the tuberculosis was still active. The area of the retinal detachment was about three times larger than when first seen. Light perception in the outer field was still present. Enucleation was advised, although owing to the general condition the prognosis as to life was poor.

Intraocular tumor?

Dr. E. M. Marbourg presented a married man, aged 30 years, who had consulted him about a year ago for gradually failing vision in the right eye. There was no history of previous injury. Vision was present only in the nasal periphery. During the past year there had been four attacks of increased tension in the affected eye. On one occasion the tension rose in twelve hours from 40 mm. to 60 mm. (MacLean). Use of the left eye for near work irritated the right eye.

External examination showed slight bulbar injection, a widely dilated, fixed pupil, and a small hyphema in the lower anterior chamber. There was a smooth gray vascular mass just behind the clear lens. No motion of the mass could be detected. The globe transilluminated only slightly on the temporal side. Enucleation was considered, but its value in saving the life of the patient was undecided. Dr. Marbourg asked in what percentage of cases metastasis occurred from intraocular sarcoma.

Discussion. Dr. R. W. Danielson suggested scleral trephining and aspiration for biopsy. He cited a case in which this method of biopsy made the pathological diagnosis.

Dr. Edward Jackson stated that the symptoms were very significant of intraocular tumor. He had never seen a case of retinal detachment with increased tension in which the eye did not contain a tumor. He cited a case in which metastasis occurred seventeen years after enucleation.

Congenital cataracts

Dr. G. H. Hopkins presented the case of R. H., aged 26 months. This patient was first seen on April 19, 1933, the mother complaining that the child apparently had very poor vision in both eyes, that the baby was delivered normally at full term, and was apparently healthy in all other respects. There were gray opacities in the pupillary areas of both eyes. The pupils were equal and responded fairly well to light. The tension was apparently normal. There was no nystagmus.

On May 3 the left lens was needled, a crucial incision being made. At this time very little cortex was seen, and the nucleus was protruding through the pupil into the anterior chamber. Dr. Hopkins asked if another discission was advisable in the near future.

Discussion. Dr. Edward Jackson thought that this nucleus might be harder than normal, as is the case in most congenital cataracts. There might also be hereditary retinal defects. He felt that watchful waiting was advisable.

Dr. O. C. Wise quoted deSchweinitz, who stated that nystagmus did not occur if blindness dated from birth.

Detachment of the retina

Dr. Hopkins also presented Mrs. J. P., aged 25 years, who was first seen in February, 1930, with the complaint that her vision had commenced to fail about six months previously. The loss of vision was rather sudden, being first noticed one morning when she attempted to read the paper. Examination showed divergence of the right eye of about 20 to 25 degrees. The left pupil was slightly larger than the right. There was some atrophy of the irides, most marked in the left eye. In the right eye there were distinct lens changes in the pupillary area, and the fundus was seen only with difficulty. There was chorioretinitis with several white bands running horizontally across the fundus in the lower portion. These bands lay beneath the retinal blood vessels. The retina was definitely detached in the lower portion. In the left eye there were several white bands, some of which were pigmented, running horizontally across the retina, below the disc. There was considerable evidence of retinochoroidal disturbance, and the retina was elevated distinctly in the outer quadrant, and somewhat in the lower portion.

Vision in the right eye was hand movements at two feet; vision in the left eye was 20/96 with correction. The blood Wassermann and urine were negative. Basal metabolism was minus 14. X-ray of the skull was negative. X-rays of the teeth showed one abscessed tooth which was removed.

The patient was placed in the hospital for rest and given potassium iodide, by mouth. Elimination was increased by saline purgatives and sweat baths. Atropine was used locally. The condition had improved somewhat, but in the past two years had remained more or less stationary. Dr. Hopkins was of the opinion that the detachments were due to retinochoroiditis. As the patient was now pregnant, he asked whether further loss of vision might occur and if so whether abortion should be induced.

Discussion. Dr. O. C. Wise advised close coöperation with the obstetrician to determine further management of the case.

The members agreed that retinochoroiditis was probably the cause of the retinal detachment.

Extreme cicatricial contraction of the lids following deep burns; Thiersch grafts

Dr. C. E. Earnest reported the case of a male Mexican, aged 33 years, who had been badly burned in a gasoline explosion on January 5, 1931. Dr. Earnest first saw the patient on March 16, 1931, when he entered the hospital with a severe corneal ulcer of the left eye. There was marked retraction of the lids so that the eyes were constantly exposed. Both ears were nearly burned off and the skin of the right nostril was shrunken. The face, head, and hands were deeply burned, leaving tissue like rotten rubber.

The first operation consisted in loosening skin of the forehead, bringing it down and filling in with Thiersch grafts. After this healed the tissue of the lids was loosened and more Thiersch grafts were applied. Following this the lower lids were operated on, whole skin being put in with sleeve grafts one at a time. Later, more Thiersch grafts were put in, after loosening any contracted places. Seven different operations were performed. The patient was dismissed on July 5, 1931, with both lids functioning normally. He had not been heard from since.

Superficial linear keratitis

Dr. O. C. Wise presented the case of Mr. N. W., aged 37 years, who gave a history of working in intense heat in a zinc smelter. The patient had had his first eye trouble in 1928. He had noticed his sight failing since February, 1933.

The patient said he had some rheumatism and frequent headaches, otherwise the history was negative. When first seen in April, 1933, there was a fairly dense infiltration of the cornea of each eye. The pupils were equal and reacted normally. Other than the corneal changes the media were clear and the fundi were normal. During the subsequent period of observation there were at least three attacks of inflammation. At this time there was no injection of the eye.

The general physical examination showed some injection of the tonsils, and carious teeth. The blood pressure was 110/80; the blood Wassermann was negative. The patient was treated locally with atropine and was given potassium iodide by mouth.

The condition improved so that at this time the eyes were quiet. The vision was 20/200 in each eye.

Discussion. Dr. Edward Jackson was of the opinion that the poor vision was due in part to high astigmatism, undoubtedly caused by distortion of the corneal curvature by repeated attacks of inflammation.

Dr. D. H. O'Rourke and Dr. G. H. Stine stated that they saw lattice-like infiltrates interspersed with faint, flat nodules in the superficial cornea, probably in the epithelium. The substantia propria was apparently clear. The condition resembled very much a corneal dystrophy or superficial linear keratitis.

Congenital amblyopia; optic atrophy

Dr. O. C. Wise also presented the case of Mr. T. F. P., aged 45 years, who gave the history of very poor vision since birth. He had uncontrollable twitching of the lids, and movements of the eyes. He had been educated at the state school for blind at Austin, Texas. Other than his eye trouble he had always been well. His father and mother were first cousins. There was one sister living who had the same eye condition as the patient. Four sisters were dead, all having died of diabetes between the ages of 9 and 18 years.

External examination showed involuntary spasm of the orbicularis oculi. There was coarse nystagmus of a mixed type. The eyes were smaller than normal. With the ophthalmoscope the media appeared clear; the nerve heads showed marked pallor in all but the upper nasal portions. No other fundus pathology was seen. The vision was very poor.

Discussion. Dr. C. A. Ringle thought that high hyperopia was also present.

Dr. O. C. Wise stated that in spite of his handicap, this man was able to plant a garden and had hitch-hiked to Texas four times by himself.

Intraocular foreign body

Dr. J. W. Thompson presented the case of C. V. W., aged 42 years, a garage mechanic, who consulted him on March 22, 1933, giving the history of something striking the right eye while buffing valves. The patient noticed several spots in his line of vision after the injury. He also gave the history of having had a small piece of steel, in the iris near the attachment with the ciliary body, in the same eye, in 1924. This foreign body was removed through a limbal incision and the eye healed promptly, recovering normal vision.

The external examination showed the cornea to be clear. There was a small subconjunctival hemorrhage in the nasal quadrant of the globe, but no wound of entrance was visible. The pupils reacted normally. With the ophthalmoscope several opacities were seen in the vitreous, particularly in the nasal half, otherwise the fundus was negative. The vision was 20/15. X-ray showed a small foreign body in the vitreous. The following day a marked iridocyclitis had developed. The cornea was hazy, the pupil small, the vitreous cloudy, and the vision was reduced to 20/200. An attempt was made to remove the foreign body through a scleral puncture in the lower quadrant, but there was no response to the magnet. After many attempts, using all the points of the magnet, and scissors inserted into the vitreous, without success, the wound was closed by conjunctival flaps. X-rays showed no change in the position of the foreign body. Intense inflammation continued. On April 19, 1933, another attempt at extraction with the magnet

through a scleral puncture in the lower nasal quadrant was again unsuccessful.

Since the last attempt at extraction, the eye had gradually quieted so that at present the eye was almost white. Through a widely dilated pupil many large vitreous opacities could be seen, but the fundus details were very dim. The patient could count fingers at twelve feet, and was slowly improving. The vitreous opacities were absorbing, the tension was below normal, but the globe still had its normal shape.

Discussion. Dr. E. E. Earnest cited a case of intraocular foreign body in which he had inserted a steel needle into the vitreous towards the foreign body, being guided by the ophthalmoscope; the foreign body was then removed by application of the magnet to the end of the needle.

Interstitial keratitis: negative Wassermann, positive Kahn

Dr. R. W. Danielson reported the case of a 16-year-old girl, who had been first seen in December with the history of having been treated for a month with ultraviolet light by a chiropractor because of an inflamed, painful eye with profuse watery discharge, photophobia, and poor vision. On examination one could see corneal opacities, deep corneal blood vessels, posterior synechiae, and marked circumcorneal injection. The vision was hand movements. A large intradermal tuberculin test was faintly positive. One infected tooth was removed. Two blood Kahn reactions were four plus and two blood Wassermann tests were entirely negative. Dr. E. R. Mugrage of the University of Colorado Medical School then ran a series of tests on a single sample of blood and found six types of flocculation tests(including the Kahn) positive and two complement fixation tests (including the Wassermann) negative.

No other signs of syphilis were found, but after antiluetic treatment and atropine, the eye not only responded promptly but also a marked acne and a mental depression had largely cleared. The corrected vision on April 7th, was 20/30. The mother was dead, cause unknown. The father and a sister had a positive Kahn, another sister was negative.

Benzylaldehyde poisoning resembling methyl alcohol poisoning

Dr. G. H. Stine reported the case of Mr. R. W., aged 21 years, who had developed headache, nausea and vomiting, weakness, blurring of vision, and diplopia a few hours after drinking cocktails made of almond extract and homemade apricot brandy. Three others in the party of convivial spirits, two women and one man, had already died a few hours after drinking the concoctions. When first seen by Dr. Stine, two days after onset, the vision was, right eye 1/15, and left eye 2/15. There was marked photophobia and some burning of the eyes. Movement of the eyes, as well as other parts of the body, caused severe pain. The external appearance of the eyes was normal. The pupils were equal and regular, reacted somewhat sluggishly to light, and normally in accommodation and convergence. The tension was normal, but the eyeballs were very tender. Although there was slight pallor of the temporal halves of the discs, the fundus picture was considered normal. Diplopia tests showed some weakness of the third, fourth, and sixth nerves; there was no ptosis. The visual fields were contracted concentrically to 25 degrees for a one-degree white target. There was a central scotoma for green. The limits for one-degree red target were 10 degrees in all meridians in the left eye and 8 degrees in the right eye. There was some enlargement of both blind spots. The neurological diagnosis was toxic multiple neuritis.

The attending physicians felt at first that prussic acid was probably the toxic agent. However, prussic acid could not be detected at the autopsy. From the ophthalmological and neurological findings Dr. Stine felt strongly that these cases were of methyl alcohol poisoning, and not in any way due to prussic acid. Further investigation revealed that the almond extract contained benzylaldehyde, which was subsequently found present in the stomachs of the deceased. There was no wood alcohol

found either at the autopsy or in the liquor.

Repeated drainage of the spinal fluid, pilocarpin sweats, purges, and treatment of the gastritis were instituted. Under this treatment the patient improved steadily so that ten days later the vision was, right eye 5/9 and left eye 5/6. There was no diplopia after the second day of observation. The form fields had widened considerably, and the central scotomas for green had vanished. There was no change in the eye grounds except possibly some increase in the capilarity of the discs.

Dr. Stine felt that the chemical similarity of the benzylaldehyde to formaldehyde, which was the chemical responsible for the symptoms in wood alcohol poisoning, accounted for the resemblance of the symptoms in this case to those seen in methyl alcohol poisoning.

Ligation of the right internal carotid artery for pulsating exophthalmos

Dr. J. J. Pattee reported follow-up notes on the case of Mrs. L. D. R., who had been presented before the society by Dr. J. W. Thompson, on May 16, 1931 (Amer. Jour. Ophth., v. 15, Jan., p. 51). The patient was markedly improved.

Unilateral exophthalmos

Dr. G. H. Hopkins reported on the present condition of Mr. G. P., whom he had presented to the society on May 16, 1931 (Amer. Jour. Ophth., 1932, v. 15, Jan., p. 53). The exophthalmos had now subsided. A diagnosis of hyperthyroidism had been considered.

Pulsating exophthalmos, ligation of the common carotid; recovery

Dr. G. H. Hopkins also reported further notes on the case of L. C., who had had a pulsating exophthalmos following fracture of the skull. This case had also been presented at the meeting of the society on May 16, 1931 (Amer. Jour. Ophth., 1932, v. 15, Jan., p. 54). Since that time a ligation of the common carotid had been performed with complete relief from the trouble. Vision in the eye was 20/20.

Multiple iron ore deposits

Dr. C. E. Earnest reported the case of B. J., aged 29 years, who was injured in October, 1931, by a premature dynamite blast while digging loose ore. The face, hands, and eye were full of ferric oxide particles, both corneas were perforated, and there were about one hundred deposits of ore in each. There were also traumatic cataracts in both eyes. The corneal foreign bodies were removed in three different stages, leaving many scars in the lower three-fifths of both eyes. In February, 1932, a peripheral iridectomy was done in the right eye above. In March the cataract in the right eye was needled. The discission was repeated in April, 1932. On June 1, 1932, the patient was dismissed. The vision in the right eye with corrections was 20/15. The left eye was blind. The tension in the right eye was normal, and minus in the left eye. Examination in March, 1933, showed no change. The patient had gone back to work.

A new loupe

Dr. H. S. Rusk showed a loupe which consisted of a strong plus lens attached to a metal head band which was placed on the patient's head with the lens centered in front of the eye to be treated. The surgeon wore a head mirror placed above and between both eyes and reflected light through the lens to the patient's eye. In this way both hands were free. The surgeon obtained good stereoscopic vision. Some adjustment was necessary to obviate disturbing reflexes from the magnifying lens.

George H. Stine,
Recorder.

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Section on Ophthalmology

March 10, 1933

Dr. H. J. Rothchild presiding

Sarcoma of the choroid

Dr. Richard Smith of Superior, Wisconsin (by invitation), reported three

cases of sarcoma of the choroid with no recurrence after five years. Two of the patients were women, both aged 62 years, the third patient a man aged 32 years. Two of the eyes were blind, the third nearly blind, but none showed evidence of local spread beyond the globe and there were no evidences of metastases. Each specimen was of spindle-cell sarcoma.

Discussion. Dr. Anderson Hilding (Duluth) said that Dr. Robertson of the Mayo Clinic had repeatedly pointed out that persons dying of cancer were apt to show other primary incipient malignancies independent of the fatal one. He seemed to think that some of the apparent metastases of malignancy after surgical removal were not metastases at all but other primary growths. If this was true, then Dr. Smith did not need to be so reticent about calling his cases cured several years after enucleation. If another growth occurred years later in a remote part of the body, it might be that it was a new growth entirely and in no way related to the eye tumor.

Dr. W. L. Benedict (Rochester) was of the opinion that one was unable to tell from the appearance of a tumor of the pigmented type the degree of malignancy. About three years ago Major Callander, of the Army Medical Museum, reported a study which he had made on 100 tumors of the eye, the age of the individual and the duration of life since the removal of the specimen. He then tried to correlate the length of time the individual had lived since the operation with the character of the cell, putting this in a manner somewhat similar to Broder's classification of carcinoma. He thought he was able to divide these pigmented tumors into three or four groups so that one could grade them by the size of the cell and mytosis within the cell. It was known that many individuals with pigmented tumors lived for several years without recurrence while others would suffer from early metatases.

Dr. Benedict recalled operating on one boy who had a very large pigmented tumors of the orbit which involved the nose, the pharynx, antrum, and hard and soft palates. This had grown over some six or eight years. He exenterated the orbit and there was so much pigment that the material was of the consistence of tar. That boy had no recurence either locally or elsewhere in four years.

Another interesting observation bore out what Dr. Hilding just said as to multiple tumors. A patient had a malignant pigmented tumor of the conjunctiva of the lower lid. Dr. Benedict exenterated the orbit and the man made a complete local recovery. Eleven years later he returned with homonymous hemianopsia. Of course it was suspected that there was an extension of this tumor. Dr. Benedict said he differed with the neurologist on the basis that these tumors very rarely metastasized to the central nervous system. The patient was operated on and a large degenerating glioma was found in the brain. It was well known that the pigmented tumors found in the skin of white horses were melanosarcomata and that they were not malignant. Dr. Benedict felt that so far there was no recognized basis of grading pigmented tumors for malignancy, and believed that one was not able to give a satisfactory prognosis.

A study of the optic angle in relation to strabismus

Dr. E. L. Armstrong (Duluth) read a paper on this subject which will be published in the American Journal of Ophthalmology.

Discussion. Dr. W. L. Benedict (Rochester) asked Dr. Armstrong if, on this series of measurements, he found anything that would lead him to believe the angle of divergence of the nerves at the chiasm had any bearing on the length of the optic canal. Also, if his deductions from these measurements had a bearing on the development of strabismus in children only and if from these deductions he could foretell the development of squint in individuals after puberty. Also, if there was any relationship between these measurements to our common clinical observation that the highest degrees of squint were commonly found in per-

sons with high refractive errors. Dr. Benedict felt this was a very interesting bit of work and the measurements correlated with later findings in a rather interesting manner, but he said he was not convinced, on first hearing these deductions, that they would account for the development of squint in persons having high refractive errors. Would these measurements correlate with the refraction of the eye one found after puberty?

Dr. E. R. Bray (St. Paul) asked if one might expect to find more divergent squint in those cases where the eyes were far apart and more convergent squint among cases where the eyes were near together? He said this had not been his experience.

Dr. Armstrong (in closing) in answer to the question as to alternating strabismus and hyperphoria, said he did not believe that that would have anything to do with this situation. There was probably some other cause that could not be explained this way. As to the large degree of hyperopia, he believed it was a factor in producing strabismus in conjunction with the underlying anatomical structure. It was because of efforts at accommodation together with refractive errors found, that would tend to develop greater degrees of strabismus. As to the wide interpupillary spaced eyes, some of those would accommodate satisfactorily having angles that fell within the normal, otherwise they would come under the external squints that would have one eye diverge if there was not enough muscular strength to hold them in focus.

Lysozyme, one of the natural defense factors of the eye

Dr. Anderson Hilding (Duluth) said that lysozyme was first described by Alexander Fleming in 1922 and since then about 25 articles had appeared dealing with its chemical characteristics and bacteriocidal action.

Lysozyme was a strongly antiseptic enzyme normally present in many of the body tissues and fluids that had the power of dissolving bacteria. It was found most abundantly in nasal mucin. Among the tissues, it was reported that cartilage and leucocytes contained most.

Wolff had prepared the material in a fairly pure form from the white of an egg. When dry it was a yellow amorphous powder that was readily soluble in water. In solution it was a colloid.

Its bacteriolytic powers were best exhibited in a neutral solution containing one-half percent salt. It was most effective against the bacteria found in the atmosphere. Fleming tested 104 strains of bacteria taken from the air of his laboratory and found that 75 percent of them dissolved more or less readily in one to 100 sputum. Against some of these bacteria lysozyme was effective in amazingly dilute solutions. Tears in a dilution as high as 1 to 512,000 had been found to possess some lytic power. Pathogenic bacteria were much less susceptible to its action than the non-pathogens from the air. The most susceptible of the bacteria normally found in man were the intestinal streptococci while among the most resistant were the B. Coli group.

There had been at least three reports upon the relation of lysozyme to eye diseases. (Ridley, Oluf Anderson, Cavka and Prica) All of these authors felt that there was a causative relation between a fall in the normal concentration of lysozyme in the tears and eye infection. The etiological relationship had not been shown convincingly in any of the diseases mentioned excepting xerophthalmia. In this disease, there was a strong evidence to support the view that vitamin-A deficiency caused a fall in the lysozyme content of tears and that this reduction of lysozyme was responsible for the invasion of the cornea by bacteria and the keratomalacia which followed.

His own experimental work with lysozyme presented at this time was confined to the relative concentrations of lysozyme found in tears, in nasal mucin, and in the lens matter and aqueous and vitreous humors taken from pig's eyes. In two series of experiments done on these five substances, the results indicated a high content in tears, a

lower content in nasal mucin, whereas the three substances from within the eye seemed to have practically no lytic power with the possible exception of aqueous. Aqueous showed partial lysis in some dilutions.

Discussion. Dr. R. C. Smith (Superior) said he wondered just how much damage rhinologists had been doing in their treatment of nasal diseases by the use of nasal packs. Attention had been called by different authors to the fact that the mucin of the nasal chambers had an inhibitory action which retarded the growth of bacteria, and, as a student, he had been cautioned against over-irrigation because of the danger of destroying this inhibitory action of the mucin.

Dr. C. N. Spratt (Minneapolis) said he had been very much interested in Ridley's paper which appeared in the British Journal of Ophthalmology in 1928. Ridley confirmed the observation of Fleming, made some six years previously, on the effect of the lacrimal secretion on bacteria. This enzyme he referred to as lysozyme, and it destroyed not only the non-pathogenic bacteria, but also most of the organisms pathogenic to man. There were two practical points to be considered: (1) Why did we use atropin in ulcers and other eye conditions? In addition to the relief of pain by keeping the iris quiet, the atropin lessened the flow of tears and consequently prevented the dilution of lysozymes. (2) The second was relative to the use of antiseptics previous to operation. As Dr. Hilding had shown, these antiseptics lessened the value of the natural protective enzyme in the tears, thus destroying the natural defenses. Dr. Spratt stated that within the last year he had received a letter from Harrison Butler of Birmingham, England, in which he stated that he had discontinued the use of drugs which inhibited the natural defenses of the tears. Dr. Butler stated that since following this procedure, his results had never been better.

Walter E. Camp,
Recorder.

AMERICAN JOURNAL OF OPHTHALMOLOGY

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EDITORIAL STAFF

LAWRENCE T. POST, editor
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GRADUATE INSTRUCTION IN OPHTHALMOLOGY

Graduate instruction in ophthalmology is still in a very chaotic stage in this country. In a few institutions systematic courses in fundamentals are offered in conjunction with systematic, clinical instruction, both didactic and practical, but these opportunities are open only to a favored few and the general run of graduate instruction is somewhat of the hit or miss variety.

Three forms of coordinated graduate instruction are required; first, for the man who wishes to become an ophthalmologist and is willing to spend from one to three years on the task. This phase is fairly well taken care of by the various larger institutions that have internships in ophthalmology. In the majority of these institutions didactic instruction is given to the interns as well as practical, clinical study.

Second, instruction should be available for the man whose training has not been adequate and who can spend from two to four months in intensive supervised work. This type of instruction was covered admirably by the Fuchs-Meller course in Vienna, now defunct. Unfortunately, there is no counter-part of that course in this country and there is crying need for it. The large eye and ear infirmaries could well busy themselves with the development of such a course.

Third, courses should be available to the practicing ophthalmologist who wishes to study for one or two weeks, for the purpose of acquainting himself with the recent clinical advances and for brushing up his weak spots. There are quite a few such courses now in existence, but the majority are unsystematized. The teachers in these courses are invited by name and not by subject; in other words, an outstanding man is invited to "come and give something," and in consequence, there is but little coordination.

In the endeavor to assist the organizations that sponsor these sporadic courses, the American Academy of Ophthalmology and Oto-Laryngology appointed a committee on extramural instruction. The function of this committee is purely advisory, for it neither

sponsors any course nor assumes any financial obligations therein, but the committee has assembled a list comprising the outstanding teachers in ophthalmology and oto-laryngology throughout this country. Each man on this list has prepared himself on some phase of his specialty down to the minutest details and has prepared the requisite models, lantern slides, illustrations, and other accessories. Furthermore the committee has listed the time of the year that each man is available.

With all of this information at hand the committee stands ready to assist any organization in the preparation of a program, whether it be for a single meeting or for a course of two weeks or more.

It is hoped that this purely altruistic move by the Academy will obtain the support it deserves. The committee has gone to great pains in obtaining this information for the benefit of the profession at large. The chairman of the committee is Dr. W. V. Mullen of Cleveland.

Harry S. Gradle.

MISCELLANEOUS STUDIES IN RETINAL DETACHMENT

Demonstration that a reasonable number of cases of retinal detachment are susceptible to cure has stimulated further investigation as to the mechanism and therapy of this disorder. While Gonin's view that in the great majority of cases a retinal tear is the direct cause of detachment is generally accepted, the exact physics and chemistry of this causal relationship are still open to debate. New methods of surgical treatment, or new variants of old methods, are rather frequently to be encountered in the literature.

Lindner is among those who believe that the activity of the extrinsic muscles of the eye is one of the factors leading to retinal detachment or to its extension when once established. A logical consequence of this belief is the practice of having the patient with a retinal detachment wear stenopeic spectacles, whether before or after operation. Lindner urges that eyes which are in danger of retinal detachment should be trained to a fixed direction of gaze; and for this purpose he has found the simplest means to be the ordering of spectacles with high marginal astigmatism, or the addition of a central correcting segment to a highly astigmatic lens (Klinische Monatsblätter für Augenheilkunde, 1933, volume 90, page 289.)

Kleiner, assistant in Lindner's clinic, has published a painstaking study of intraocular tension in cases of retinal detachment (Graefe's Archiv, 1933, volume 129, page 485). He finds the difference of tension between cases of detachment and normal eyes to average about four millimeters of mercury. Fifty percent of all eyes showing detachment are hypotonic (less than sixteen millimeters, measured with the original Schiötz tonometer), and in three-fourths of all cases the tension of the eye with detachment is lower than that of the other eye. The older the detachment the lower the tension. About four months after healing of detachment the tension in both eyes is usually equal.

Kleiner summarizes as follows Lindner's interpretation of the mechanism of lowered tension after detachment: Under the influence of the choroidal circulation, the vitreous, directly exposed to the choroidal vessels through the retinal hole, becomes gradually liquefied, and at the same time the ocular movements of rotation force fluid under the retina, where it is absorbed by the choroid. This loss of fluid is replaced by seepage of new-formed aqueous toward the retinal hole. For some reason not understood, the framework of the vitreous seems to undergo condensation in the presence of such seepage, so that the retina tends to be more and more retracted by the vitreous; while at the same time every increase in size of the detachment increases in turn the resorption surface of the choroid.

Two years ago Lindner applied a special method to detachment accompanied by a hole in the region of the macula. This method consists of undermining the choroid with a spatula inserted through an incision in the sclera, and the immediate injection of a weak solution of caustic potash between choroid

and sclera. Lindner recently gave a report of late results in nine cases so treated. (Klinische Monatsblätter für Augenheilkunde, 1933, volume 90, page 757.) For a distinct group of retinal detachments, and particularly those with holes in the region of the macula, he finds his "undermining" method to be the most satisfactory.

He insists that demonstration of the existence of a hole in the macular region is only possible by sharply focusing the ophthalmoscopic light filament upon the retina. Macular holes are secondary to more peripheral tears, and in the majority of cases Lindner regards them as being possible only in the presence of a pathologic adhesion between choroid and retina in the macular region.

The scleral incision is usually made above the insertion of the inferior oblique muscle. After the macular undermining and injection are completed, peripheral tears are blocked off with electrocoagulation. It is surprising that secondary changes in retinal structure observed ophthalmoscopically after healing were slight, and the average recovery of vision after this operation was rather better than the average obtained by other methods. A case in which the undermining operation was done twice on the same eye obtained corrected vision of 6/36.

Rubbrecht, who a year earlier had recommended the use of jequiritol for cauterizing the choroid through the scleral trephine opening, recently reported to the French Ophthalmological Society (see also Archives d'Ophtalmologie, 1933, volume 170, page 608) on two cases of retinal detachment in which he had produced the necessary adhesions between sclera, choroid, and retina by means of silk sutures passed through all these tissues. (Preliminary communications on the same subject had already been presented by the author to the Belgian Ophthalmological Society and to the International Congress in Madrid). He argues that the essential problem is to provoke between these three tissues an inflammation in which the proliferative factor dominates and the exudative factor is reduced to a minimum, since it is from the interpenetration of proliferating cells from choroid and retina that solid and lasting adhesion is to be anticipated. He lays down as a third condition that the retina is to be attached to the choroid at the moment of application of the irritating agent. Experimenting upon the rabbit, he found that a period of two days was sufficient for the creation of extensive and substantial adhesions after the use of number 00 silk thread.

At the time of his last report Rubbrecht had treated two human cases of retinal detachment by this method, apparently with complete success. In each case two sutures were inserted, the needle entering at the edge of the detachment and coming out through the detached retina and so through the choroid and sclera. No harmful reaction was encountered.

Perhaps the boldest procedure for treatment of retinal detachment is that most recently reported by Lindner (Zeitschrift für Augenheilkunde, 1933, volume 81, page 277). In prognostically unfavorable cases he has excised large strips of sclera parallel with the ocular equator. As more particularly suited to such heroic recourse he mentions cases with visible adhesions between retinal folds, or with bands of scar tissue adherent to the retina, or cases which within a few weeks from their onset show the typical anemone shape ordinarily thought of as the terminal stage of detachment. In other cases, resort to this revolutionary procedure has been compelled by a postoperative complication of Gonin's method, in the form of tightly stretched folds of retina between the optic disc and the point of cauterization, or between two points of cauterization, or in the form of retinal folds radiating from the point of cauterization.

For adequate contact between the lips of the scleral wound it was found necessary to adopt a special suture obtained by carrying the needle from one cut surface to the other midway between the external and internal aspects of the sclera. The point of exit of the vortex veins must be carefully avoided. Parallelism between the lines of scleral excision is obtained by using a pair of

compasses as carrier for the scleral knife. Lindner has excised a scleral strip in each quadrant of the globe, but has done the operation in two stages, two strips being excised at each stage.

Such scleral excisions naturally shorten the anteroposterior diameter of the eyeball and so incidentally reduce myopia, so that quite obviously the question arises whether this operation might not be applied to ordinary myopic eyes for the purpose of reducing or abolishing their myopia and also to relieve tension upon the internal coats of the eye.

W. H. Crisp.

THE CATARACT INCISION

The corneal section must always interfere with the nutritive supply of the cornea. It separates a large area of the non-vascular tissue from its nutritive supply. Here lies the immediate danger of the cataract operation. The danger cannot be wholly removed by making the incision in the corneal limbus. Cutting across the vessels will leave a vascular supply on the scleral side; but will largely destroy the functional connection of the parts of vessels left attached to the cornea.

The longer the corneal section the greater the danger. But too short a section to permit the easy escape of the lens, is the most embarrassing error likely to appear in a cataract extraction. The size of the lens, and the proportion of it that is soft enough to change shape under pressure, are matters for nice judgment, based on careful observation and experience.

The larger size of the lens, and the longer incision required to allow its escape, is the serious defect of the intracapsular extraction. It is probable that the smaller, softer nucleus of cataract, at less advanced age, has made better success possible for the intracapsular operation in India, than it would have among the ripe senile cataracts of America. Capsulotomy permits reduction in the size of most cataracts that are to be extracted. The theoretic advantage of removal of the capsule with the lens, will not entirely balance the longer corneal incision.

Next to undue length, irregularities in the section are to be avoided. The ideal smoothness of the section is obtained by one steady forward movement of the knife. It can never be obtained by a sawing movement, or by pauses that allow a change in the direction of the cutting edge. The narrower the knife the more of these changes there are likely to be, each making a slight angle in the section. A long narrow knife is almost sure to be used with a back and forth sawing motion.

A broader knife is more likely to complete the incision by one forward thrust. If it is attempted to do this with one forward thrust of a narrow knife the eyeball is pulled around, following the knife. With a narrow knife the point enters easily by a forward trust. But as the knife edge approaches the arch of the cornea the resistance to it increases, and the edge is pulled around. Just before the completion of the incision the resistance rapidly decreases, and the knife comes out with a jerk. The knife proposed by the writer has a bulging edge, that cuts with less pressure as the incision approaches completion; avoiding the tendency to turn the eye and end with a jerk.

The tendency to push the eye around by the forward thrust, is best controlled by placing the fixation forceps just below the point chosen for the counter puncture. The tendency to pull the cornea up by the pressure of the cutting edge, especially if this is not perfectly sharp, must also be borne in mind. Any turning of the eye during the incision causes a departure from the perfect incision that has been planned. Sometimes the thick back of a Graefe knife will drag the eye around.

The knife must not be too long. A prick of the skin on the side of the nose at the end of the forward thrust, will cause the patient to start. This is most likely to happen with a long Graefe knife, and if the eye has been pushed around with the forward thrust. It is disconcerting to both patient and surgeon.

A broad knife helps to a smooth steady incision. But the broader the knife the greater the spread of its point;

and this compels more pressure to make the puncture and counter puncture. The Beer knife has varied in size and form; and is liable to be made too broad. Even to make a full section in the limbus, a knife 5 mm. wide at its widest point is sufficient. The writer found that a knife 4.5 mm. wide at the widest point was enough. This knife was planned to complete the section with one forward thrust. The back of the knife balances the push of the cutting edge; so that there is no tendency to turn the cornea up, and the cut is filled so that the aqueous does not escape. But after the cutting edge has passed entirely out of the anterior chamber into the limbus, it is found that the thin bridge of tissue remaining is easily divided as the knife is withdrawn. An almost imperceptible tilt of the point does it.

A perfect corneal section almost ensures a perfect operative result. While it is being made the attention must be concentrated on the cutting edge. This is helped by the greatest simplicity of technic. Nothing else should intrude upon the operator's mind.

Edward Jackson.

UNIVERSITY MERGERS

We are passing through difficult days; trying for the doctor and trying for hospitals, medical schools and universities. Incomes from practices and endowments have been seriously curtailed. As if this were not enough, the very foundations of the medical art have been rocked by questions of the soundness of present methods of caring for the sick. At such a time it is exceedingly difficult to maintain the standards of medical education on the high plane which had been reached. Economies have been necessary and some of these have been so drastic as to be destructive.

There is at present a plan under consideration to combine Northwestern University and the University of Chicago. It may safely be assumed that this is a measure of economy. The excuse of thus making "The largest educational institution in the world" by such a union, is obviously a pretext. Biggest has so seldom been Best. The idea, we understand, is to close Rush Medical School and to have the Presbyterian Hospital take over the Billings Clinics; graduate teaching and research to be concentrated on the University of Chicago campus and the undergraduate medical course to be on the Northwestern campus. Temporarily, undergraduate college courses would be continued by both schools. We have only a limited knowledge of the two universities, of their similarities and dissimilarities, and so do not feel qualified to discuss any but the most obvious features, among which is that to exclude research and graduate teaching from the Northwestern campus would cut off a most important association from the medical student, and to discontinue Rush Medical School after the splendid record of achievement through many years would be little short of tragic.

As has been frequently observed, a university is far more than bricks and mortar. It is the embodiment of a spirit built on loyalty, tradition and affection. Faculty, students and alumni therein have a unity most important in the development of instructors and pupils. A combination of two schools to produce one big school will disturb all these things and be a real setback.

Another characteristic of mergers is that they are usually for the purpose of bolstering one weak member and more oftener than not the weaker is the only one which profits and the whole structure is less sound than the better of the two.

Regarding the departments of ophthalmology in these two great universities, their development has been watched with great interest by the profession. Each has had an able director with apparently very distinctive ideas as to the future of ophthalmology. The departments have been conducted on quite different plans and the possibility of an equable and advantageous consolidation of them is hard to visualize. It will be a pity if they cannot be continued and be developed along the lines outlined by their directors. Their success might give a hint as to the soundness of the basic principles underlying each.

We feel that medicine will be best served by a maintenance of the integrity of these two universities and we hope that this can be done.

Lawrence T. Post.

BOOK NOTICES

Trudi pervovo vseukrainskovo syezda oftalmologov (Transactions of the first All-Ukrainian Ophthalmological Congress). 390 pages, illustrated. Published by the State Medical Press of Ukraine, Kharkov. 1931.

This first All-Ukrainian congress, held in 1929, constitutes a milestone in the progress of Soviet ophthalmology. A few of the papers have already appeared in the Soviet and foreign ophthalmic journals, but quite apart from their clinical interest many of the contributions, but particularly the discussions and resolutions, throw valuable sidelights on the status of ophthalmology in the Soviet Union. These social aspects would pass unrecorded in the usual course of abstracting. We learn, for instance, that about 80 per cent of the 420 ophthalmologists, who serve a population of 30,000,000, attended the congress, that over 81 percent of the members were delegated by organizations and institutions, that half of them were women, and that half of them were in their thirties and less than ten years in practice. Before the revolution there were 120-200 in the same territory. Incidentally only 2.7 percent were members of the communist party.

Characteristic of the social preoccupations of the country is the list of official themes of the congress: The ophthalmic services in the Ukraine; Blindness and its etiology in the Ukraine; Occupational eye diseases and traumas; Trachoma; Lues and the eye; Physiotherapy in ophthalmology. In addition, under "varia," efficiency, or "rationalization" as they call it, as applied to ophthalmic practice was dealt with.

The Government's representative, in his opening address, called attention to the ophthalmic needs of the rural population, the apparently universally "forgotten man," and to the need for a study of the effects of poison gas on the eye, in view of the essentially chemical character of the warfare of the future. In accordance with the five-year plan, the ophthalmic needs of the Ukraine are stated to be 600 ophthalmologists and one eye bed to 20,000 rural population, one bed to 15,000 city inhabitants, and one to 10,000 industrial workers. At present they have 846 eye beds, in special and general hospitals. Graduate instruction is provided for by widely varying courses, running from one month to three years, and in accordance with the purpose and the finances of the institutions that pay for them. The principal research and teaching institution is the Hirschman Memorial Eye Hospital at Kharkov. To judge from the discussions, clinical ophthalmology and private practice continue to lure the bulk of the ophthalmologists as is elsewhere the case.

From Satonskaya and others we learn that trauma, trachoma, and neuroretinal affections head the list of causes of blindness, and that, due to preventive work, there are only 32 blind from ophthalmia neonatorum under one year. With an eye-disease incidence of 5-6 percent, there is noted an absolute increase of industrial traumas, due either to the clumsiness of the new industrial recruits or to the inadequacy of the safety measures. Eye traumas among the rural population are also quite prevalent and are more serious in prognosis. A study by Popov of the relation between subnormal visual acuity from errors of refraction and the incidence of corneal foreign bodies among industrial workers not provided with goggles indicates that the former is only a factor when it is less than 20/100. Five to 5½ percent of all traumas in the metal industries are eye traumas, half of industrial eye traumas lead to temporary disability averaging 6 days. Natanson stresses the need for special courses in industrial ophthalmology and in the examination of eyes for compensation purposes. To make flying particles glance off more readily, he suggests that goggles should be periscopic and, to encourage workers in their use, the incorporation of the wearer's correction of refraction. Aggravation of myopia by occupation is noted among proofreaders and printers,

and periodic eye examinations of these workers is advocated. Dvorzhetz reports experimental work on photo-opthalmia and notes aqueous and vitreous turbidity in from 9 to 12 days and lens opacification in about a month.

Surveys of trachoma incidence—3.3 percent—and of the trachoma problem by Vasyutinsky, Medvedev and others and their discussions, establish the fact that the disease is acquired mainly in childhood, that complications are encountered principally in the adult to the extent of 50 percent, that it is practically limited to the rural population, and that it is more prevalent among the national minorities. Varyingly unfavorable sanitary conditions and eagerness to escape military service among the minorities are said to be factors. The classification adopted for trachoma registration in the U.S.S.R. and finding general favor is into: Trachoma Dubium, Trachoma I (infiltration without scars), Trachoma II (infiltration with scars), and Trachoma III (scars only).

Blonsky's "rationalization," a sort of "conveyor" system, which enables him to dispose of 115 patients, including major operations, in a 4 hour session, met with scant approval.

Byelsky reports favorable results from the use of Stscherbak's method of indirect electrotherapy, that is, stimulation of the cervical sympathetic by galvanic collars, mud neck-warmers and diathermy, in 100 eye cases with a very wide range of pathology, finds the neck-warmers most useful, particularly in chronic glaucoma, and states to have seen reflex iridoplegia disappear under treatment.

Filatov's report on his keratoplastic work, with 10 percent successes, has, I believe, already appeared in print.

The next congress is to be held this year and the program is: Occupational eye pathology; Glaucoma; Tuberculosis, and Physiotherapy.

With the exception of one paper and its discussion in the Ukrainian language, the Russian language is used throughout. At the end of the volume abstracts of the leading papers in German are supplied. The reviewer has however used the Oxford system of transliteration, current in the American Journal of Ophthalmology rather than the German one used in the abstracts. The ukrainization of the old Russian proper names introduces an additional difficulty in transliteration to be overcome for reference purposes. Kharkov is transliterated by the Ukrainians themselves as Kharkiv, for instance.

In the discussion there are frequent complaints of the lack and expensiveness of ophthalmic equipment, most of which has to be imported. (Recently, however, Rabkin, in the Vrachebnoye Dyelo for April 1932, calls attention to the availability of magnets and non-breakable goggles of domestic manufacture.) As an example of the graphic art the volume leaves much to be desired in paper, print and illustration, and demonstrates how much the Soviet Union has had to tighten its belt, culturally as well as materially, to carry out its five-year plan.

M. Davidson.

Stereoskopische Bilder für schielende Kinder (Stereoscopic pictures for school children). By Prof. Dr. C. H. Sattler. Published by Ferdinand Enke, Stuttgart. Price, RM 6.10. 1933.

The set consists of 54 double pictures with an explanation of the method of using them and appropriate questions for each pair. The series is arranged to be progressively difficult. The pictures in each pair are separate so that the space between them can be made as wide as desired. The pictures are black on white, clear and interesting to the child. The set should prove valuable. In a clinic there might be danger of misplacing a member of a pair so that time would be lost in locating it but in a private office the fact that each one of a pair was on a separate card would probably be no handicap.

Lawrence T. Post.

Bilder für Stereoskopische Übungen, zum Gebrauch für Schielende. (Pictures for stereoscopic practice for the use of pupils.) By C. Dahlfeld. In two parts. Part 1, thirteenth printing; part 11, third printing. Published by Ferdinand Enke, Stuttgart. Price RM 5.85, each part, 1933.

Part I consists of 33 cards, the first 26 of which are paired objects in which a part of the picture appears in each illustration. The last 6 are illustrations of paired rings to show and train depth perception.

Part II is made up of 30 cards, the first 10 are numbers and reading in which it is necessary to use both eyes to complete the charts. The other pictures are excellent as indicating, or training depth perception. The fact that the few reading cards are in German would be a handicap in English speaking countries. In training fusion one of the difficulties is the meagerness of variety in cards for the child who must practice frequently. This set and the one by Sattler will prove helpful additions.

Lawrence T. Post.

CORRESPONDENCE

Divergences of Principles and Differences of Technics in the Treatment of Retinal Detachment

Lausanne, October 1933

The interesting report made by Dr. M. Davidson (Amer. Jour. Ophth., July, 1933) on his "Impressions of the Madrid Congress" contains a passage which could perpetuate a wrong idea about the nature of the divergence of opinion between Sourdille of Nantes and me. Dr. Davidson wrote: "The evident popularity of the Weve diathermy procedure and its modifications has served to make the Gonin-Sourdille controversy somewhat academic." Some readers may have understood that it was because diathermy had proved to be preferable to both the technics used by Sourdille and by myself, so that it deprived of interest any further discussion about those technics. In fact the "Gonin-Sourdille controversy" must not be restricted to a mere difference of technic, first because Sourdille has been using the thermopuncture as well as myself in some (three) of the first cases he operated upon; secondly because the thermopuncture I resorted to was by no means the essential nor a necessary part of the operative treatment which I have patronized.

The characteristic point and the scope of this treatment is to block up the retinal holes, through which the vitreous fluid passes into the subretinal space, no matter what kind of operation or procedure may lead to that result, whilst Sourdille repeatedly emphasized that "he attaches no importance either to the existence or to the site of the retinal tears" and that, far from aiming at the closure of those tears, "he deliberately creates new ones." (Bull. Soc. d'Opht. de Paris, 1929, p. 692).

One sees that the controversy rests on a deep divergence of principles, the particulars of technic not being in question here. It is therefore an error to oppose, as many authors do, the "Gonin operation" (understanding thus thermopuncture) to the "Sourdille operation" (meaning generally single scleral punctures followed by subconjunctival injections of HgCn). On the one hand, I did not object to the first attempts of Sourdille with cyanide, provided that they should be made at the site of the retinal tears (Rev. gén. d'opht. 1923, p. 340); on the other hand, I declared from the beginning (1921, Annales d'ocul., 158, p. 192, and Amer. Jour. Ophth., 1930, p. 624), that the "blockage" of a retinal tear could be done in a different way than by thermopuncture, so that the recent methods aiming at the same scope are by no means fit to make "academic" my controversy with Sourdille; it would be rather more exact to say that the good results of Weve and others with his diathermic procedure have contributed to make the Gonin-Sourdille controversy useless by settling it definitively in favour of the one, who always pointed out the importance of searching for the retinal tears and of blocking them up by any means or procedure.

J. Gonin.

November 17, 1933

"Professor Gonin has been kind enough to send me the above for insertion in the Journal, instead of sending it directly to the Journal. The Gonin-Sourdille controversy is, needless to say, beyond my competence, and by my words 'somewhat academic' I only meant that the reports of the diathermy procedures diverted attention from it at the Congress.

M. Davidson

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy and embryology

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3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Lebensohn, J. E. **Factors in the determination and interpretation of visual acuity.** Arch. of Ophth., 1933, v. 10, July, pp. 103-109.

This is a review of the literature of the subject. The principal factors to be considered are refractive error, visual angle and illumination.

M. H. Post.

Park, R. S., and Park, G. E. **The center of ocular rotation in the horizontal plane.** Amer. Jour. of Physiology, 1933, v. 104, June, p. 545.

The authors used a new instrument, and after technical discussion of their work they conclude that the center of ocular rotation is not fixed, but moves along a curve a variable distance nasalward from the visual axis and always on a line perpendicular to the visual axis. (Ten references, four figures.)

Ralph W. Danielson.

Pflugk, Albert. **New method in investigation of the theory of accommodation. Contribution 2, accommodation in the emmetropic eye.** Graefe's Arch., 1933, v. 130, p. 239.

The author has experimentally shown that the zonule possesses much greater ability to stretch than the lens capsule. This tension of the zonule would prevent the equatorial cross section of the lens from enlarging. The zonule is constantly in a condition of tension. The state of the lens for distance is the condition in which the lens and ciliary muscle are at rest. In the accommodative position for near, the strongest refractive layers of the lens in the region of the anterior pole are displaced further toward this pole, so that increase in the axis of the lens and diminution of its equatorial cross section occur simultaneously.

H. D. Lamb.

Rodin, F. H. **Etiology of myopia.** Arch. of Ophth., 1933, v. 9, Feb., pp. 264-277.

This is a review of the literature of the subject. The author makes a distinction between true myopia and high myopia, the former being nature's adaptation to the continuously increasing degree of culture, and the latter a disease of the eye.

M. H. Post.

Smith, G. E. **The evolution of instruments of vision.** Trans. Ophth. Soc. United Kingdom, 1931, v. 51, pp. 399-411.

In mammals greater analysis of visual impulses is associated with development of the fore-brain. The eyes help regulate those activities of the animal

which are involved in the attainment of skill. Conscious control comes with the development of a new cortex, which is closely linked with oral sensation and the movements of the mouth and tongue. Ability to perform movements of greater variety and complexity increases. The expansion of the prefrontal area in monkeys has been found to be directly associated with control of the wider range of conjugate movements of the eyes. Coincident with and dependent on the development of the macula the lateral geniculate body increases in size. Thomas D. Allen.

4. OCULAR MOVEMENTS

Davis, W. T. **Esophoria and exophoria as the cause of obstinate asthenopia: cure by surgical and other means.** Arch. of Ophth., 1933, v. 10, Oct., pp. 455-464.

The author holds that many cases would be better off after surgical intervention, as the wearing of glasses, for correcting refractive errors or muscular imbalances, has a bad psychological effect upon children, and is well nigh impossible in many occupations. He finds the reaction from a Jameson recession much less and recovery more satisfactory than from advancement operations. M. H. Post.

Dunnington, J. H. **The proper time for operation in strabismus.** Arch. of Ophth., 1933, v. 10, Oct., pp. 348-349.

Once it has been decided that operation is necessary, delay is undesirable, and favors stubborn diplopia.
M. H. Post.

Eames, T. H. **Physiological exophoria in relation to age.** Arch. of Ophth., 1933, v. 9, Jan., pp. 104-105.

The author found that physiological exophoria gradually grew greater as the amplitude of accommodation decreased with age. M. H. Post.

Griffith, A. D. **Squint and binocular vision.** Trans. Ophth. Soc. United Kingdom, 1931, v. 51, pp. 286-296.

According to the author there is a sort of suppression that is an essential part of good fusion. Parts of the field of the fixing eye may be suppressed and details seen only with the other eye fill in this area. Supression dominates in a squinting eye, and in order properly to stimulate such an eye to see the other must be occluded constantly, not merely for two hours daily, otherwise vision is stimulated for two hours and is suppressed for twelve hours daily. Some new pictures for use with the Worth amblyoscope are illustrated and explained. Thomas D. Allen.

Hesse, Robert. **The amblyopia of the squinting eye.** Graefe's Arch., 1933, v. 130, p. 375.

Of 226 cases of strabismus, 41 were alternating and 185 unilateral. Among the 185 cases (160 convergent and 25 divergent) of unilateral squint, 145 cases (127 convergent and 18 divergent) showed amblyopia of the squinting eye. In 58 of the 127 cases of unilateral convergent squint and in 14 of the 18 cases of unilateral divergent squint, there were changes in the amblyopic eye which explained its diminished vision. Among the remaining 40 cases of unilateral squint (33 convergent and 7 divergent), where amblyopia was absent, in 8 the squint had been present for 6 to 10 years, in 14 for 11 to 15 years, in 10 for 16 to 20 years, in 3 for 21 to 25 years and in 3 for over 25 years. Thus in the amblyopia of squinting eyes there are other factors beside nonuse of the eye. H. D. Lamb.

Holm, Ejler. **Latent ocular nystagmus.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1932, pp. 14-15, In Hospitalstidende, 1933, Sept. 14.

A boy of seven years, who had convergent strabismus which was relieved entirely by glasses, showed a nystagmus in either eye if the other was coverer. The nystagmus had its slow component nasally and the quick temporally toward the point of fixation. There was limitation of rotation of each eyeball temporally and it was thought that the nystagmus arose because of the difficulty of securing fixation in this direction. No nystagmus was apparent if both eyes were open, for then the left eye would fix on looking to the right and the right eye would fix on looking to the left. D. L. Tilderquist.

Maddox, Miss. **The orthoptic treatment of strabismus.** Trans. Ophth. Soc. United Kingdom, 1931. v. 51, pp. 296-303.

This deals with the results of cases treated routinely. The order of treatment is: (1) reduction of amblyopia. (2)riddance of false projection and cultivation of first and second grade fusion. (3) operation; followed within ten to fourteen days by (4) continuation of treatment (development of stereopsis, duction exercises).

The results recorded are extraordinarily good. In discussion less perfect results were admitted by others, and very early operation was not supported.

Thomas D. Allen.

Ohm, J. **Addition to the knowledge of nystagmus. Contribution 31, the optokinetic reaction in congenital nystagmus, part 2.** Graefe's Arch., 1933, v. 130, p. 198.

This review of the relation between the optokinetic reaction and congenital nystagmus is here concluded.

H. D. Lamb.

Ohm, J. **In what tract does fusion take place?** Zeit. f. Augenh., 1933, v. 81, Aug., p. 142.

Ohm compares the motor nuclei with the pipes of the pipe organ. They are associated into complex functions by supranuclear mechanisms. The intermediary mechanism, the so-called supranuclear center, he believes is located in the central vestibular nucleus.

That the vestibular nuclei take an important part in mechanism of fusion is shown by analysis of nystagmograms in miner's nystagmus and in the closely related spasmus nutans.

The author argues that since the vestibular nuclei originate such contradirectional impulses they must play a part in the production of squint. When the ability to fuse is absent the coordinating complex is absent in the nuclei or they are not connected with the descending radiations.

F. Herbert Haessler.

Ohm, J. **Opticokinetic nystagmus and nystagmography in diagnosis of brain lesions. Part 3, multiple sclerosis.** Arch. f. Augenh., 1933, v. 107, Aug., p. 417.

In multiple sclerosis, Ohm found that spontaneous nystagmus was absent in the primary position. Abduction produced nystagmus to that side. The amplitude, and to a certain extent the frequency, varied with the degree of abduction. The smaller the frequency the greater the disturbance. The nystagmus may be more consistent on abduction to the left than to the right, or vice versa. Frederick C. Cordes

Pascal, J. I. **Analytic duction tests.** Arch. of Ophth., 1933, v. 9, April, pp. 635-637.

In making duction tests it is important not only to take note of the breaking point and the recovery point, but also the blur point. This latter indicates the stage at which accommodation comes into play in association with the change of convergence. The best balance appears to be obtained when the blur point is about one-half the break point. M. H. Post.

Rava, G. **The so-called paralytic oculocephalic deviation due to a lesion of a cerebral hemisphere.** Riv. Oto-Neuro-Oft., 1933, v. 10, March-April, pp. 211-222.

In cases of cerebral apoplexy, the deviation produced when the patient looks toward his cerebral focus is provoked by the sensorial visual reflex of the sound side, which is no longer balanced by the diseased. The author gives several case histories and demonstrates that this type of deviation is not accentuated, and its cephalic component disappears if the head is passively moved. It is present in light stupor and disappears if the patient regains consciousness or goes into deep coma. It may reappear if the patient's sensorial centers are stimulated. In some cases it disappears during sleep and in the dark. M. Lombardo.

Wells, D. W. **Depth perception with the Bishop-Harman diaphragm test.** Arch. of Ophth., 1933, v. 9, March, pp. 450-452.

This communication was written in answer to a statement by Lloyd that six percent of 300 patients examined by

him had binocular vision for distance but not for near. The author feels that one who shows good fusion with the stereoscope has binocular vision for near, but that possibly it is not always used. When such a condition exists "controlled reading with the triple bars and the five bar grill" will prove of benefit. M. H. Post.

Wilkinson, Oscar. **Surgical treatment of concomitant strabismus.** Rev. de Ophth. de São Paulo, 1933, v. 3, Sept., pp. 25-38.

The author describes (in Portuguese translation) the resection operation, using two sutures which pass through the sclera and conjunctiva. He is in favor of early operation when glasses have failed to correct the squint. W. H. Crisp.

5. CONJUNCTIVA

Ernyei, I. **Tumor-like degenerations of the conjunctiva.** Graefe's Arch. 1933, v. 130. p. 384.

Of six cases, the first two were one of chronic and the other of acute trachoma with the usual histologic findings. In the third case, without signs of definite trachoma, typical plasmomas had developed at the caruncle and in the fornices. The next two cases (trachoma) showed proliferation of plasma cells with hyaline degeneration. In the last case, two small tumors from the upper fornix and some thickened conjunctiva from the upper lid presented a ring of amyloid around the blood-vessels, and the thickened palpebral conjunctiva showed many large irregularly round or oval nests of amyloid. The author thinks these changes only different steps of a pathologic process from a single cause. (usually trachoma). H. D. Lamb.

Olitsky, P. K., and Tyler, R. **Trachoma in Egypt.** Arch. of Ophth., 1933, v. 10, Oct., pp. 440-447.

From bacteriological studies trachoma in Egypt and in New York appear to be essentially the same, but the native Egyptian has greater resistance than the New Yorker. As to Bacterium granulosis the authors' opinions confirm those of Noguchi. M. H. Post.

Riehm, W. **Remarks on Guillery's theory of the tuberculo-toxic origin of phlyctenules and sympathetic ophthalmia.** Arch. f. Augenh., 1933, v. 107, Aug., pp. 344-365. (See Section 7, Uveal tract, sympathetic disease, and aqueous humor.)

6. CORNEA AND SCLERA

Brown, E. V. L., and Katz., D. **Dystrophia adiposa corneae.** Trans. Amer. Ophth. Soc., 1932, v. 30, pp. 173-209.

In the literature the authors found eight undoubted cases of this condition. Their own case report includes chemical and microscopic studies of the cornea. Experimentally they produced arcus lipoides corneae in rabbits by cholesterol-oil feeding. They conclude that the condition is due to impairment of the physiologic process of the corneal cells, resulting in deposition of fat. Corneal vascularization results, and transports phagocytic elements, including histiocytes. No theory is offered to explain the impairment of physiologic cell function. C. Allen Dickey.

Bussola, E. **Bacteriology, culture, and experimental study of keratomycosis aspergillina.** Rassegna Ital. d'Ottal., 1933, v. 2, May-June, p. 432.

Three different types of infection occur, ulcerative, nodular, and infiltrative. The case reported was seen in a forty-eight-year-old peasant whose left eye was scratched by a dry leaf. Three mm. from the limbus there appeared a turbid white opacity, nodular in aspect and about 2 mm. in diameter. Small vessels ran from the limbus to the focus. Cultural studies determined that the organism was aspergilla fumigatus, the most usual of the aspergillae. It was cultured and a rabbit's eye inoculated by injection into the cornea. Studied histologically, the rabbit eye showed diffuse and perivascular infiltration of the iris and ciliary body, dilated and thrombosed vessels, capillary hemorrhages, superficial new-vessel formation, and necrosis and exfoliation of epithelium. (One illustration.) Eugene M. Blake.

Darling, C. G. **Separation of the iris corneal adhesion (seclusio pupillae) for**

the cure of corneal staphyloma. Amer. Jour. Ophth., 1933, v. 16, Nov., pp. 995-996.

Duc. C. **Corneal tattooing with platinum chloride.** Rassegna Ital. d'Ottal., 1933, v. 2, May-June, p. 447.

Duc advocates Krautbauer's method. This consists in removal of the epithelium over the area to be colored and application of a two percent solution of platinum chloride held in contact with the cornea for two minutes, followed by instillation of a two percent solution of hydrazin hydrate for twenty seconds and ending with copious water irrigation.

In rabbit experiments, Duc found the epithelium intact, the deposition of pigment regular and uniform. The deposit is subepithelial and the deeper cornea is quite normal. (seven illustrations.)

Eugene M. Blake.

Friede, Reinhard. **The areas of cornea and sclera in the embryo and newborn and their relationship to megalocornea in the adult.** Zeit. f. Augenh., 1933, v. 81, Sept., p. 213.

Megalocornea is not a form of gigantism but merely a biological variant that is associated with a corresponding decrease in scleral area. This relationship is characteristic of the eyes of infants and children up to five and occasionally to ten years. If the measurements of the eyes of infants are enlarged proportionately so that the diameter of the globe becomes 24 mm. the corneal diameter varies between 12 and 20 mm.

F. Herbert Haessler.

Friede, Reinhard. **The variability of the horizontal and vertical corneal diameters and of the areas of the cornea and sclera in megalocornea, normal cornea, and microcornea.** Zeit. f. Augenh., 1933. v. 81, Aug., p. 132.

The author measured the corneal diameters of 10,940 eyes with a Wessely keratometer. The arithmetic mean for the vertical diameter is 11.12 mm., for the horizontal 11.56 mm. It has escaped notice that there is a variation of the relation of corneal area to size of sclera. Microcornea does not necessarily imply microphthalmos. There are small corneas in normal globes and even small corneas with myopia. Giant eyes apparently do not exist. Human megalocornea is a physiologic variant of the relation of corneal area to sclera which might be called macrocornea-microsclera.

F. Herbert Haessler.

Julianelle, L. A., Morris, M. C., and Harrison, R. W. **An experimental study of corneal vascularization.** Amer. Jour. Ophth., 1933, v. 16, Nov., pp. 962-966.

Krause, A. C. **The chemical composition of the albumin of the cornea.** Arch. f. Augenh., 1933, v. 107, Aug., p. 453.

Krause finds that the mucoid of the substantia propria of the cornea is a glyco-albuminoid that varies from the mucoid of the sclera. The gelatine of the cornea was shown to be typical gelatine. The chemical structure of the elastin is identical with that of the sclera. Descemet's membrane differs from the other albuminoids of the cornea in that it contains a greater quantity of aminocarbohydrates. Frederick C. Cordes.

Mans, R. **Microphthalmos with defective development of the lens. A further contribution to the essential formation of congenital corneal opacities.** Graefe's Arch., 1933, v. 130, p. 180. (See Section 13, Eyeball and orbit.)

Mattos, W. B. **Syphilis of the sclera.** Rev. de Ophth. de São Paulo, 1933, v. 3, Sept., pp. 70-73.

A girl of seventeen years had been undergoing annually a course treatment for congenital lues. She had a positive blood Wassermann, but was said to be intolerant to bismuth and arsenicals. She came on account of reduced vision and ocular redness and pain. She showed an incipient iritis, and was put on injections of camphocarbonate of bismuth. But she developed two ulcerations of the sclera above the cornea, one measuring 5 by 3 mm., the other 2 mm. in diameter, and each having a depth of approximately 2 mm., with uveal tissue visible at the bottom of the ulcerations. She was put upon further bismuth injections, in combination with 914 (one

of the successors to salvarsan), and almost immediately began to show frank cicatrization of the ulcers. These had completely healed at the end of sixteen days, and no intolerance was displayed to repeated injections of the two antisyphilitic drugs. W. H. Crisp.

Terrien, F. **Factors contributing to interstitial keratitis.** Arch. d'Opht., 1933, v. 50, Sept., p. 614.

Traumatism is undoubtedly a factor in setting off the inflammation in many cases. In the writer's statistics eighty percent of the attacks occurred between the ages of six and twenty-five years, and over sixty-five percent occurred in the female sex. He believes that disturbance of glands of internal secretion may be an important factor. If disturbances of internal secretion are discovered, specific glandular or pluriglandular treatment should be used in addition to antisyphilitic therapy.

M. F. Weymann.

Thomas, J. W. T. **Microscopic appearances of corneal grafts.** Brit. Jour. Ophth., 1933, v. 17, Sept., p. 529.

Corneal grafting in rabbits is divided into six main groups: (1) transplantation of the whole of the cornea with some conjunctiva, (2) central or paracentral grafts with stitches, (3) central grafts without stitches, (4) marginal grafts with stitches, (5) central grafts with parallel stitches passing over them, and (6) central grafts with "cross stitches." Dense opacity of a corneal graft appears to be associated particularly with the following factors: (a) adhesion of the iris to the graft, (b) folding of Descemet's membrane, (c) new tissue formation behind Descemet's membrane (often vascularized), (d) vascularization of the graft from the periphery through the cornea, (e) vascularization of the graft from an adherent iris, (f) increased nucleation of the superficial vascularization, (g) large increase in the nuclear content of the graft, (h) the formation of irregular spaces (sometimes spindle-shaped) between the graft fibers, causing irregular refraction and diffraction of light, and (i) relatively large increase in thickness of the graft. (Ten microphotographs.)

D. F. Harbridge.

Vontobel, Walter. **Examination of the lens and cornea in cases of Mongolian idiocy.** Graefe's Arch., 1933, v. 130, p. 325. (See Section 9, Crystalline lens.)

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Eilers, W. **A. case of atypical coloboma of the choroid.** Arch. f. Augenh., 1933, v. 107, Aug. p. 500.

Eilers reports a case of atypical coloboma of the choroid, situated nasally and above the disc. In the same meridians above and below were medullated nerve fibers. Frederick C. Cordes.

Loeffler, Anna. **A case of coloboma of the choroid with glial proliferation which had produced the clinical picture of pseudoglioma.** Zeit. f. Augenh., 1933, v. 81, Aug., p. 155.

Histological preparations are described from an eye of a nine-months-old child, enucleated because clinical manifestations suggested glioma. There was typical coloboma of the choroid, with a glial thickening of the retina which formed a mass of folded tissue occupying the entire area between the equator and the posterior surface of the lens. F. Herbert Haessler.

Pierce, H. F., Friedenwald, J. S., and Freeman, D. **The gas content of the intraocular fluid.** Amer. Jour. of Physiology, 1933, v. 104, June, p. 553.

After a description of the technique the authors conclude that the oxygen content of the intraocular fluid is slightly above that of venous blood. The partial pressure of oxygen in the intraocular fluid is between 40 and 50 mm. Hg. The partial pressure of carbon dioxide in the intraocular fluid is more variable than that of the oxygen, but the average is slightly below that of arterial blood. (Three references.)

Ralph W. Danielson.

Procksch, Marie. **On spontaneous detachment of the choroid.** Zeit. f. Augenh. 1933, v. 81, Sept., p. 224.

In a patient with an untreated iritis of one month duration a severe acute hypotony with deep anterior chamber and extensive choroidal detachment developed on the fourth day of treatment with glaucosan. Later retinal detachment also developed. Probably the glaucosan produced toxic inhibition of ciliary secretion with consecutive hypotony. This in turn brought about collapse of the folds of the ciliary body with further hypotony. When the intraocular pressure had fallen so low that the sclera could no longer adapt itself to the decreasing ocular contents, fluid was supposedly aspirated from the choroidal vessels and accumulated between choroid and sclera, the mechanism being similar to that postulated by Meller for postoperative choroidal detachment.

Possibly in most eyes first seen with retinal detachment and hypotony the retinal detachment is secondary to choroidal detachment. It is too seldom emphasized that postoperative choroidal detachment is useful in protecting the retina against damage.

F. Herbert Haessler.

Riehm, W. **Remarks on Guillery's theory of the tuberculotoxic origin of phlyctenules and sympathetic ophthalmia.** Arch. f. Augenh., 1933, v. 107, Aug., p. 344-365.

Riehm does not agree with Guillery's theory. He feels that in phlyctenules the tubercle bacilli play an active part locally, but they are damaged organisms that cannot multiply locally. In sympathetic ophthalmia, tuberculosis plays no part unless one includes posttraumatic tuberculous uveitis as a type of sympathetic ophthalmia. The author's theory is that sympathetic ophthalmia is a disease produced by a yet unknown organism that causes secondary infection in certain unduly sensitive individuals.

Frederick C. Cordes.

Roese, H. F. **Congenital ectopia lentis inherited through four generations.** Zeit. f. Augenh., 1933, v. 81, Aug., p. 149.

Of the twenty-nine children, grandchildren, and great-grandchildren of a woman afflicted with ectopia lentis, five males and females were affected. The anomaly was dominant and heterozygous. In one of the cases glaucoma followed luxation into the vitreous and was relieved by extraction of the lens with a loop. In three patients the abnormally mobile lens became incarcerated in the anterior chamber. Of five attempts to extract the len from the anterior chamber three failed. It might be better to give atropin so as to allow the lens to slip back into the vitreous rather than hold it in the anterior chamber with miotics until the very dangerous attempt at surgical removal can be made. F. Herbert Haessler.

Samuels, Bernard. **Significance of specific infiltration at the site of injury in sympathetic ophthalmia.** Trans. Amer. Ophth. Soc., 1932, v. 30, pp. 253-267. (See Amer. Jour. Ophth., 1933, v. 16, Sept., p. 829.)

Walker, A. M. **Comparison of the chemical composition of aqueous humor, cerebrospinal fluid, lymph, and blood from frogs, higher animals, and man.** Jour. of Biol. Chemistry. 1933, v. 101, June, p. 269.

The aqueous in the frog showed the same deficiency in reducing substances and inorganic phosphates as the spinal fluid. In higher animals and in man there was a uniform deficiency of phosphates. The urea concentration in the aqueous of the rabbit, the dog, and man is on the average thirty percent less than in the plasma.

The concentration of uric acid in the aqueous of fowls and men is about thirty-four percent less than in the plasma.

Reasons are given for the belief that neither incomplete filtrability nor utilization of carbohydrates by tissues of the brain or eye can explain these discrepancies. The conclusion is drawn that the choroidal and the ciliary epithelium exhibit selective qualities not possessed by capillary endothelium or by the glomerular membrane, and that neither cerebrospinal fluid nor aqueous

humor is formed by a simple process of filtration or dialysis.

M. E. Marcove.

Ziporkes, Joseph. **Glassy network in the anterior chamber.** Arch. of Ophth., 1933, v. 10, Oct., pp. 517-519.

Glassy networks adherent to the posterior surface of the cornea occur in about seventeen percent of cases of syphilitic keratitis. They may resemble folds of Descemet's membrane, or more rarely may lie in the anterior chamber attached to the posterior surface of the cornea by filaments. Both types develop from fibrinous frameworks along which Descemet's membrane proliferates and secretes hyaline. M. H. Post.

8. GLAUCOMA AND OCULAR TENSION

Brazeau, G. N. **Unilateral reflex pupillary contractions in glaucoma.** Arch. of Ophth., 1933, v. 9, March, p. 452.

After section of the cornea preparatory to performance of iridectomy for inflammatory glaucoma, the pupil changed its shape rapidly, first becoming a long, narrow slit, then pyriform, then bulbous. The patient was a syphilitic morphinomaniac. The author could find no similar case reported.

M. H. Post.

Friedenwald, J. S., and Pierce, H. F. **Circulation of the aqueous. 3. The reabsorption of crystalloids.** Arch. of Ophth., 1933, v. 10, Oct., pp. 449-454.

The authors had previously concluded that the chief factor in reabsorption was Schlemm's canal. From experiments now reported they conclude that crystalloids from the anterior chamber diffuse for the most part by way of the vessels of the iris, and in smaller amount through the canal of Schlemm. The vasomotor control of the vascular connections of Schlemm's canal and of the iris vessels is somewhat independent. The rate of absorption of water increases more rapidly than that of foreign crystalloids when intraocular pressure has been raised.

M. H. Post.

Fuchs, A. **Progress in operative treatment of acute glaucoma.** Rev. de Ophth. de São Paulo, 1933, v. 3, Sept., pp. 3-9.

This is a translation in Portuguese of the article abstracted on page 935 of the October issue of this Journal.

Greenwood, Allen. **Comparison of operations for chronic glaucoma.** Arch. of Ophth., 1933, v. 10, Oct., pp. 472-482.

In the opinion of the author of this paper, iridencleisis with sclerectomy is the operation of choice for cases of congestive glaucoma with fairly high tension, while trephining is preferable for those with the simple noncongestive type, especially with low tension. A small sclerectomy added to the usual iridencleisis operation has obviated the necessity of prolonged massage and the use of pilocarpin during convalescence. The writer does not recommend splitting the cornea any farther than is necessary to get the base of the conjunctival flap out of the way, and to insure that at least a part of the hole lies over the anterior chamber. In iridencleisis he prefers to snip the iris on both sides of the forceps, as this gives a narrow, regular coloboma. A number of case reports are appended. M. H. Post.

Koch, C. and Fischer, F. P. The extensibility of the outer coat of the eye. Arch. f. Augenh., 1933, v. 107, Aug., p. 444.

Using enucleated eyes, the authors found that under pressure the eyes of old rabbits were considerably more extensible than those of young rabbits. A detailed description of the apparatus used is also given.

Frederick C. Cordes.

Liebermann, L. V. **Comparative evaluation of glaucoma operations and some remarks on the technique of cyclodialysis and scleral trephining.** Zeit. f. Augenh., 1933, v. 81, Aug., p. 117.

Iridectomy is effective in almost all cases of acute glaucoma, in more than half of cases of chronic congestive glaucoma, and in much less than half of those with glaucoma simplex. In eyes which suggest that a malignant reaction may follow the operation cyclodialysis

is indicated. It is effective in many cases, not too difficult to perform, and can if necessary be followed by other operations. For acute glaucoma iridectomy is still the operation of choice. Here cyclodialysis is useless and with trephining there is the danger of late infection. For juvenile glaucoma the author puts cyclodialysis first, trephining second. F. Herbert Haessler.

Smith, J. W. **Progressive refraction changes following trephine operation.** Arch. of Ophth., 1933, v. 9, Feb., pp. 259-261.

The eye required eleven changes of lenses, varying from moderately high hyperopia to moderately high myopia. M. H. Post.

Sondermann, R. **The origin and nature of primary glaucoma.** Arch. f. Augenh., 1933, v. 107, Aug., p. 457.

Exact knowledge of the basis of normal intraocular tension is necessary before one can do experimental work on the etiology of glaucoma. The various anatomical factors and the theories of glaucoma are considered. Senile changes in the sclera run parallel with those of the intima of the great vessels, while those in the ciliary processes run parallel with the senile changes of the glomeruli of the kidneys. The anatomical differences between glaucoma simplex and acute inflammatory glaucoma are discussed. Sondermann feels that in most cases primary glaucoma is an ophthalmosclerosis of one form or other. Frederick C. Cordes.

Yudkin, M., and Gilman, A. **Osmotic equilibrium between blood and intraocular fluid as influenced by anisotonic injections: clinical significance.** Arch. of Ophth., 1933, v. 10, Oct., pp. 465-471.

The authors found the arterial blood and the aqueous humor in the dog isotonic, and introduction of hypertonic and hypotonic solutions into the former produced parallel changes in the latter. This equilibration proceeded more easily and quickly when the blood was hypertonic to the aqueous than under the opposite condition. They doubt the therapeutic value of introduction of hypertonic solutions for reduction of intraocular tension, because of the rapidity with which such equilibration took place. M. H. Post.

9. CRYSTALLINE LENS

Alvis, B. Y., and Wiener, M. **Very high astigmatism in keratoconus and postcataract cases.** Amer. Jour. Ophth., 1933, v. 16, Nov., pp. 981-985.

Bedell, A. J. **Some remarks on the etiology of cataracts.** Amer. Jour. Ophth., 1933, v. 16, Nov., pp. 945-950.

Dimitry, T. J. **A vacuum grasping instrument for removing of cataract in capsule.** Arch. of Ophth., 1933, v. 9, Feb., pp. 261-263.

The vacuum is produced by withdrawal of a plunger from a cylinder, under control of a stop-cock. The whole apparatus is about the size of a large fountain pen. M. H. Post.

Germani, C. **Experimental researches on the vitality of the lens.** Rassegna Ital. d'Ottal., 1933, v. 2, May-June, p. 417.

Germani used a large number of frog, fowl, and calf eyes and observed the changes which occurred in the first few hours after removal of the lens from the eye (a) at incubator temperature, (b) at room temperature, and (c) in the refrigerator. The lenses were kept in an isoosmotic solution of sodium chloride, 1.3 percent. The lens "survives" for a few hours and actually shows proliferation of the capsular epithelium, then the fibers begin to break down and globules form between the fibers, which finally succumb. The lens survives longer (ten to twenty hours) at room temperature or in the ice-box. The various stages are minutely described for each series of experiments.
Eugene M. Blake.

Goldmann, Hans. **Experimental observations on the genesis of heat cataract. Communications 3, 4, and 5. The physics of heat cataract,** parts 1, 2, and 3. Graefe's Arch., 1933, v. 130, pp. 93, 131, and 140.

By means of a thermoelectric couple of platinum and gold-platinum wire, carefully inserted into the anterior chamber just in front of the iris, in the posterior chamber just behind the iris, and at the posterior surface of the lens, the author was able to determine accurately the temperature at these depths under varying conditions of external and body temperature. At ordinary room temperature, the anterior chamber was the coldest and the posterior pole of the lens the warmest position investigated. When the external temperature was higher, these temperatures within the eye became more alike or even reversed. The temperature in the anterior chamber and the iris was found to vary also with the size of the palpebral fissure. At ordinary room temperature, glaucosan caused a definite diminution of the temperature in the eye, and intensification of the action of cooling solutions.

It was found that a temperature of about 44 to 50° C. behind the iris of the rabbit was necessary to produce within 100 hours definite opacities at the posterior suture of the lens. It was possible to produce within fifteen minutes an acute opacity of the lens visible with the slit-lamp, only when the temperature behind the iris was maintained at about 50 to 51° C.

In a rolling-mill, the eyes of two rabbits were exposed to conditions of heat similar to those of a foundry worker before a furnace of from 1200 to 1250° C. Using the platinum-gold-platinum element behind the iris of the rabbit's eye, it was found that the temperature here was elevated 4.6 and 6.4° C. respectively. When the rays were filtered through 5 mm. of distilled water, the increase of temperature behind the iris amounted only to 2.0 to 1.3° C. respectively.

Using a short-circuit furnace whose interior temperature could be elevated to 1500° C., exposure of the rabbit's eye at such a distance that the intensity corresponded to 7.7 calories per square cm. per minute caused in ninety seconds an elevation of temperature behind the iris of about 11.1° C. When the same intensity of rays was filtered through 5 mm. of distilled water and no saline solution was dropped upon the eye, the elevation of temperature behind the pigmented iris in sixty seconds was about 0.6° C., and at the posterior pole of the lens in the same interval about 0.1 to 0.2° C. It cannot therefore be that warming of the lens is produced only by penetrating ultrared rays absorbed into the iris. It is much more likely that heat-cataract is due to warming of the lens particularly at its anterior surface. H. D. Lamb.

Horner, W. D., and Maisler, S. **Ectopia lentis: Report of a case of total dislocation, directly downward.** Jour. Amer. Med. Assoc., 1933, v. 101, Oct. 21, p. 1302.

There was congenital total dislocation of both lenses in a boy of ten years. There was also an old monocular chorioretinitis and a persistent pupillary membrane. Bifocal lenses gave definite improvement. (Discussion.)

George H. Stine.

Koch, C., and Fischer, F. P. **Loss of fluorescence of the lens in ultraviolet light.** Arch. f. Augenh., 1933, v. 107, Aug., p. 440.

In an article that does not lend itself to abstracting, the authors discuss the various substances that reduce the fluorescence of the lens.

Frederick C. Cordes.

Langston, W. C., Day, P. L., and Cosgrove, K. W. **Cataract in the albino mouse resulting from a deficiency of vitamin G (B_2).** Arch. of Ophth., 1933, v. 10, Oct., pp. 508-514.

Forty-seven animals are tabulated. Seventy-nine percent showed keratitis after an average of forty-three days on the diet. Cataract appeared in ninety-six percent within forty-eight days, and ophthalmia in fifty-seven percent within fifty days. The vitamin G deficiency was apparently the sole cause of the keratitis, cataract, and ophthalmia.

M. H. Post.

Rauh, Walter. **The plastosomes of the developing lens. A contribution to the knowledge of cell respiration.** Graefe's Arch., 1933, v. 130, p. 213.

Plastosomes could be demonstrated in the lens of the rat in stages of development from 11 to 12 somites to somewhat over three years. They were constantly found in the epithelium and cortex but were absent in the nucleus of the lens soon after birth. These facts in conjunction with other physiologico-chemical relations were held to prove persistent cell respiration of the rat's lens. H. D. Lamb.

Sauermann, Albrecht. **Contribution to the problem of enzyme-action in the mechanism of cataract.** Amer. Jour. Ophth., 1933, v. 16, Nov., pp. 985-993.

Schmoll, Gertrud. **Observations on the blood-sugar content in rabbits poisoned with naphthalin.** Graefe's Arch., 1933, v. 130, p. 347.

Repeated estimations of blood-sugar were made in thirteen rabbits before and after introduction of one gram of naphthalin per kilogram of body weight. The naphthalin was given through a stomach tube. So much variation occurred in many rabbits in measurements for blood-sugar before the naphthalin was given that only in two animals could there be said to be a somewhat higher amount of blood-sugar after the naphthalin poisoning than before. H. D. Lamb.

Smith, Henry. **Treatment of after cataract.** Arch. of Ophth., 1933, v. 9, April, p. 368.

The author now removes all after cataracts rather than attempting needling operations. The first stage of the procedure consists in inserting an iris repositor and separating the attachments of the iris to the after cataract. M. H. Post.

Vontobel, Walter. **Examination of the lens and cornea in cases of Mongolian idiocy.** Graefe's Arch., 1933, v. 130, p. 325.

Among twenty-five patients with Mongolian idiocy, only one patient among the nine under nine years of age showed fine dots of opacity in both lenses, while of sixteen patients nine years and older thirteen presented these lens changes. In the overwhelming majority of the author's cases, the lens changes were small spots of cerulean opacity in the deeper cortex and in the region of the nucleus. In thirteen eyes, a more or less pronounced stellate opacity associated with the anterior or posterior embryonal suture-figures was observed in the lens. H. D. Lamb.

Woods, A. C., and Burky, E. L. **The possible influence of immunological factors in the production of cataract.** Amer. Jour. Ophth., 1933, v. 16, Nov., pp. 951-961.

10. RETINA AND VITREOUS

Adler, F. H. **Disciform degeneration of the macula (Junius and Kuhnt).** Arch. of Ophth., 1933, v. 10, Sept., pp. 379-386.

This is a review of the literature since the appearance of Junius and Kuhnt's paper in 1926. The outstanding feature of disciform degeneration of the macula is an exudate in the macular region which gradually increases in size and pushes forward into the vitreous, giving the appearance of tumor formation. There is gradual loss of central vision. The retinal vessels show marked sclerotic changes and strands of connective tissue appear. The differential diagnosis from malignant tumor must be carefully made. The author adds one case report. M. H. Post.

Bücklers, Max. **The regeneration of the retina after operative removal. Experiments with Rana temporaria L.** Graefe's Arch., 1933, v. 130, p. 257.

Rana temporaria L. regenerated its retina if partly or entirely removed in the larval stage. After partial extirpation, the defect was replaced by proliferating pigmented cells. The ganglion cells proceeded to the wound and there formed a layer of cylindrical cells of embryonal character upon the previously developed pigment epithelium. Other characteristic retinal cell structures also appeared. After total extirpation of the retina, the regeneration began at the posterior surface of the iris in two sharply circumscribed spots, one dorsal and the other ventral. A shell of

tissue grew posteriorly along the capsule of the lens. H. D. Lamb.

Buffington, W. R. **Primary diseases of the retinal blood vessels.** Southern Med. Jour., 1933, v. 26, June, p. 481.

Buffington gives a well organized discussion of spasm of retinal arteries, aneurisms of the retinal blood vessels, recurrent retinal hemorrhage, traumatic angiopathic retinitis, vascular changes due to direct injury, and Coats' disease. (12 figures, 26 references, discussion.) Ralph W. Danielson.

Carr, T. A., and Stallard, H. B. **A case of angiogliomatosis retinae with pathological report.** Brit. Jour. Ophth., 1933, v. 17, Sept., p. 525.

In a male, aged fifteen years, the growth occupied the upper temporal quadrant and protruded forward somewhat in the shape of a collar button. Within two years it had completely obscured the disc. No other lesion was found elsewhere in the body on clinical examination. The histological picture suggested that the neoplasm was of relatively benign character and was even retrogressive in parts where cystic degeneration and formation of bone and amyloid bodies had taken place. (Four microphotographs.)
D. F. Harbridge.

Cohrs, P. **Hereditary lack of development and hypoplasia of the neuroepithelial layer.** Arch. f. Augenh., 1933, v. 107, Aug., p. 489.

Cohrs reports a hereditary congenital defect of the retina found in white mice. This he describes as a hereditary lack of development with hypoplasia of the neuroepithelial layer of the retina.
Frederick C. Cordes.

Coppez, Henri. **Concerning the conditions which should determine operative intervention in detachment of the retina.** Arch. d'Opht., 1933, v. 50, Sept., p. 593.

The use of diathermy with a pyrometric electrode comes closest to answering all requirements. The technique of Gonin is admitted to offer the surest method of obliteration of the retinal tear when one is present. Otherwise, his method and those of chemical cauterization are less certain and they cause more destruction than the use of diathermy. M. F. Weymann.

Coppez, H. **The present treatment of detachment of the retina.** Bull. de l'Acad. Royale de Méd. de Belgique, 1933, v. 8, no. 13, pp. 381-388.

This is practically a repetition of the contribution offered by Léon Coppez to the Société Française d'Ophtalmologie, in which the latter author criticized the use of diathermy for retinal detachment without accurate measurement of the temperature attained, and described a thermostatic method of measuring the temperature developed in the sclera. (Bulletin Société Française d'Ophtalmologie, 1932, 45th year, page 281; also see editorial American Journal of Ophthalmology, 1933, volume 16, page 1004.) W. H. Crisp.

Coppez, Léon. **The use of the pyrometric electrode in the treatment of detachment of the retina.** Arch. d'Opht., 1933, v. 50, Sept., p. 598.

Attention is called to the unreliability of using the milliamperage reading as a gauge for the temperature produced in the use of diathermy electrodes on the eye. In order to measure accurately the temperature at the site of application, and in order to use the same dosage of heat in all individuals, the author uses a "pyrometric electrode." This consists of a thermocouple with a thermometer from which the temperature is read. The electrode is brought to a temperature of eighty degrees in about the same areas as chosen by Guist for his trephine openings. The sclera is then partially trephined over two or three of the heated areas and punctured to allow subretinal fluid to escape. After healing, the ophthalmoscope shows areas of retinal atrophy surrounded by a ring of pigment corresponding to each application of the pyrometric electrode. A table is given to show the wide variation in current used to obtain the same temperature in different individuals. Four il-

lustrations show the wiring of the apparatus, the operating room set-up, the operative field, and the ophthalmoscopic appearance of the fundus after healing. M. F. Weymann.

Dirion, J. K. **Diabetic retinitis.** Arch. of Ophth., 1933, v. 9, May, pp. 829-839.

The findings in the retina are not pathognomonic of diabetes. This is a review of the subject. Hypertension, the commonest accompanying condition, is usually considered the exciting factor. A typical retinal picture is one of guttate hemorrhages occurring throughout the retina, not always near vessels. Improvement in general condition is not necessarily followed by improvement in the retinal condition.
M. H. Post.

Goldenburg, Michael. **Unusual type of detachment of the retina.** Arch. of Ophth., 1933, v. 9, Feb., pp. 256-258.

In two cases the retina, torn loose at the ora serrata above, had fallen forward over the disc, obscuring to a very great extent the remaining attached portion. M. H. Post.

Gray, W. A. **The ocular conditions in diabetes mellitus.** Brit. Jour. Ophth., 1933, v. 17, Oct., p. 577.

The total number of diabetic cases examined was 583. True diabetic cataract occurred in only two instances. The incidence of retinal sclerosis was higher the older the patient. The author holds that a characteristic form of retinitis frequently exists in diabetes. It begins in the central part of the retina as whitish-yellow spots. Hemorrhages may be due to the effect of toxin causing causing secondary changes in the vessels, or mechanically, to hypertension. Four illustrative cases are related in detail. A reduction in intraocular tension occurs in a large percentage of the cases of diabetic coma. The sixth section is devoted to a discussion of lens changes. The last section considers ocular nerve paresis in diabetes. (72 references, 4 statistical tables, 4 case reports, 5 microphotographs.)
D. F. Harbridge.

Horniker, E. **Remarks on the essay of Heinrich Stern in this journal "On entoscopy and its clinical application".** Zeit. f. Augenh., 1933, v. 81, Sept., p. 244.

(Controversial.) Stern's assertion that the central angioneurotic retinal disturbance which Horniker reported in eighteen carefully studied patients is merely the manifestation of a mild choroiditis is not proved by Stern's three inadequately studied eyes.
F. Herbert Haessler.

Hurwitz, C. E. **Cyst in the vitreous.** Arch. of Ophth., 1933, v. 9, May, pp. 825-827.

This cyst appeared to be about the size of the optic disc. It was round, transparent, slightly pigmented, and unattached to any structure in the eye. Hurwitz felt that it originated congenitally in the ciliary process.
M. H. Post.

Kakyi, S. **Three hundred cases of cilioretinal artery.** Klinika Oczna, 1933, v. 11, pt. 1, p. 1.

These were observed in 3402 fundi. Eighty-seven percent were of the papillary and marginal types, 5.8 percent of the intermarginal, and 6.6 percent of the transmarginal, proving that most cilioretinal arteries originate from the circle of Zinn. As a new vascular anomaly the author describes a "ciliociliary loop". This small artery appears at the temporal edge of the optic disc as a marginal cilioretinal vessel, running an S-shaped course for a short distance and disappearing in the choroid.
M. Beigelman.

Langdon, H. M. **Amaurosis after uterine hemorrhage with distortion of vision following transfusion.** Arch. of Ophth., 1933, v. 10, July, pp. 99-102.

After two transfusions the patient's condition improved to a point where panhysterectomy and appendectomy could be done. After this operation the vision remained somewhat involved, but four months after discharge had returned practically to normal. The discs were slightly pale and the patient complained that "things were dark", proba-

bly from disturbance of the retinal cell elements, with injury to the light sense. Massive transfusions offer a most valuable method for preservation of vision and should be resorted to at once. The anemia is the sole factor in the production of the neuroretinal condition.

M. H. Post.

Levine, Joseph. **Is retinitis pigmentosa due to vitamin deficiency?** Arch. of Ophth., 1933, v. 9, March, pp. 453-458.

This is a review of the literature. The normal retina contains a superabundance of vitamin A, especially in its rods, which are the retinal elements most involved in retinitis pigmentosa. Administration of vitamin A has seemed to be indicated in cases of retinitis pigmentosa, but such therapy has proved of no value. M. H. Post.

Pollnow, Leo. **Familial occurrence of circinate retinitis.** Zeit. f. Augenh., 1933, v. 81, Aug., p. 164.

The author describes his findings in two cases, members of the same family, namely aunt and niece.

F. Herbert Haessler.

Rubbrecht, R. **Suture in the treatment of detachment of the retina.** Arch. d'Opht., 1933, v. 50, Sept., p. 608.

To produce retinochoroidal adhesions the writer placed sutures of 00 silk in the eyes of rabbits. Left for two days they produced satisfactory adhesions. Then sutures were placed in two human eyes lost by reason of old detachment of the retina. No unfavorable reaction was produced. Finally two patients with recent detachment of the retina were operated upon by placing two sutures at the border of the detachment and leaving them for two days. In each case reattachment was obtained with useful vision. Illustrations show the reaction in the animal eyes, the method of placing sutures in the operative cases, and the final visual fields.

M. F. Weymann.

Rutherford, C. W. **Asteroid bodies in the vitreous.** Arch. of Ophth., 1933, v. 9, Jan., pp. 106-117.

This is a review of the literature of the subject.

Sondermann, R. **Intraocular tension and detachment.** Arch. f. Augenh., 1933, v. 107, Aug., pp. 367-379.

Lobeck attempted to prove experimentally that the subretinal fluid that passes through the retinal tear is absorbed by the choroid, and this he felt accounted for the low intraocular tension and the slight tendency toward healing. Sondermann refutes Lobeck's theory. He discusses the conditions under which resorption of the subretinal fluid takes place.

Frederick C. Cordes.

Wilmer, W. H., Pierce, H. F., and Friedenwald, J. S. **The light streaks on the retinal blood vessels.** Trans. Amer. Ophth. Soc., 1932, v. 30, pp. 310-324. (See Amer. Jour. Ophth., 1933, v. 16, June, p. 565.)

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Castresana y Guinea, A. **Vascular spasms in the visual apparatus.** Rev. de Ophth. de São Paulo, 1933, v. 3, Sept., pp. 10-24.

This article of fourteen pages discusses the subject in Spanish under the headings of arterial spasms in the retina, arterial spasm between the optic disc and the primary optic nuclei, and arterial spasm between the primary nuclei and the cerebral cortex, and in relation to anatomy, etiology, symptomatology, and treatment. No new case is reported. The author favors the attempt to relieve either spasm or actual obstruction of the central artery with vasodilators. W. H. Crisp.

Paton, Leslie. **A symposium on the diagnosis of intracranial new-growths.** (Opening paper) Trans. Ophth. Soc., United Kingdom, 1931, v. 51, pp. 364-373.

In papilledema the height of the swelling in general varies inversely as the distance of the tumor from the aqueduct of Sylvius. Especially is this true of cerebellar tumors; but tumor in the pons may not cause swelling of the

nerve head. The author mentions several syndromes involving the ocular muscles. The value of nystagmus as a clinical sign is difficult to estimate. Tumors may also interfere with physiologic nystagmus. (Discussion.)

Thomas D. Allen.

Poljak, G. B. **Three cases of membrana epipapillaris.** Zeit. f. Augenh., 1933, v. 81, Sept., p. 251.

The eyegrounds of three eyes exhibiting this anomaly are described.

F. Herbert Haessler.

Reese, A. B. **Pigmentation of the optic nerve.** Trans. Amer. Ophth. Soc., 1932, v. 30, pp. 338-343. (See Amer. Jour. Ophth., 1933, v. 16, Sept., p. 843.)

Schreiber, Ludwig. **So-called atrophic discoloration of the optic disc and its ability to retrogress.** Graefe's Arch., 1933, v. 130, p. 312.

A single woman of twenty-nine years, who had symptoms of adiposogenital dystrophy, came with optic atrophy in both eyes, diminution of vision in the right eye to 1/7 and in the left eye to 1/3, and bitemporal hemianopsia. After two x-ray treatments of the hypophyseal region with an interval of seven weeks, the color of the optic nerves became normal, the vision in both eyes was 5/5, and the fields of vision showed no contraction.

H. D. Lamb.

Spinelli, F. **Pseudopapilla from a congenital condition.** Arch. di Ottal., 1933, v. 40, May, pp. 237-246.

The author describes a case of hypermetropia above twenty diopters, showing pseudopapillitis and a verruca of the lamina vitrea. (Colored plate.)

Herman D. Scarney.

Vele, M. **Paracentesis of the anterior chamber and injection of atropin as a therapeutic coadjuvant in optic atrophy.** Arch. di Ottal., 1933, v. 40, May, pp. 203-236.

The author used this treatment in twenty-four cases (atropin hypodermatically). He noted definite improvement of vision in luetic cases. In a case of retinitis pigmentosa there was improvement in one eye. In cases of chronic retrobulbar neuritis caused by alcohol or tobacco, definite improvement was shown. The benefit is due to vasodilatation. Herman D. Scarney.

Vercelli, G., and Ferrero, V. **Ventriculographic localization of a tumor of the left frontal pole.** Riv. Oto-Neuro-Oft., 1933, v. 10, March-April, pp. 203-210.

A woman of thirty-five years had frequent obscuration of vision after an attack of tonicclonic contractions of the left side of the face and the left arm, and morning attacks of fronto-occipital headache which persisted during several months. The pupils were equal and reacted normally. Vision was 10/10 for each eye, the visual fields showed concentric contraction, the blind spots were enlarged, and both discs showed a marked edema. Radiography showed signs of intracranial hypertension. Lumbar puncture revealed a high pressure and the Wassermann was negative. Four months later the patient was readmitted to the hospital almost blind and showing papilledema and left motor hemiplegia. The ventriculographic findings revealed compression and deformity of the frontal horn of the left lateral ventricle, indicating a tumor of the left frontal pole. A big gliomatous cyst of this region was evacuated, and after x-ray treatment the general and local symptoms improved and the patient recovered 10/10 vision for the right eye. (Three figures.) M. Lombardo.

12. VISUAL TRACTS AND CENTERS

Castresana y Guinea, A. **Vascular spasms in the visual apparatus.** Rev. de Ophth. de São Paulo, 1933, v. 3, Sept., pp. 10-24. (See Section 11, Optic nerve and toxic amblyopias.)

Cushman, Beulah. **Studies of the visual fields in functional headaches of pituitary origin.** Jour. Amer. Med. Assoc., 1933, v. 101, Sept. 9, p. 837.

In ten case reports the majority of the visual fields show contraction of the superior temporal quadrant for color and varying changes in the form fields.

These cases indicate that certain periodic headaches and also discomfort of the eyes simulating ciliary spasm may be due to dysfunction of the organically sound pituitary gland or to distension of its capsule by physiologic hypertrophy, and, in cases in which there is no improvement upon correction of the refractive error, visual fields may aid in the diagnosis. One-half of the cases reported obtained relief from headache after x-ray treatment, and in the other half glandular therapy was of benefit. (Ten case reports, ten figures, one table.) George H. Stine.

Evans, J. N. **Ophthalmic aspects of cerebral syndromes.** Arch. of Ophth., 1933, v. 10, Aug., pp. 241-253.

This is a review of the literature. Local damage to the optic nerve is first considered, after which the mechanism by which ocular lesions result from increased intracranial pressure is outlined, and finally the various syndromes are briefly described. M. H. Post.

Lisch, K. **The changes in the peripheral visual tract in multiple sclerosis.** Arch. f. Augenh., 1933, v. 107, Aug., p. 380-416.

Twelve cases of multiple sclerosis showed definite histologic changes in the optic nerve, chiasm, or visual tract. In most instances the disease was well marked, and all showed the typical changes seen in other parts of the nervous system in multiple sclerosis. (Microphotographs.)

Frederick C. Cordes.

Lundsgaard, Ruth. **Giant hypophyseal tumor.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1932, pp. 11-14. In Hospitalstidende, 1933, Sept. 14.

A woman of fifty-nine years had had attacks of headache and vomiting at the age of twenty-five to thirty years. At forty-five years she discovered accidentally that the right eye was blind. The vision of the left eye then began to fail and the patient became completely blind in about two years. Two years ago she began to be somnolent and would sleep if she sat down. The left eyeball was found dislocated forward, the orbit filled with tumor masses, and the left cheek bone unduly prominent. The right eye also protruded. Roentgenograms showed destruction of the sella turcica, of the left orbit, of the medial wall of the right orbit, and of the nasal cavity and sinuses. In spite of the advanced stage of the growth its origin could apparently be traced to the hypophysis. D. L. Tilderquist.

Ranson, S. W., and Magoun, H. W. **Respiratory and pupillary reactions induced by electrical stimulation of the hypothalamus.** Arch. of Neur. and Psych., 1933, v. 29, June, pp. 1179-1194.

The authors stimulated electrically the hypothalamus in twenty-two cats. Marked bilateral dilatation of the pupils was obtained from the lateral hypothalamic area and the region surrounding the fornix. The pupillary reactions appeared at the level of the anterior hypothalamic nucleus, extended along the course of the lateral hypothalamic area caudal to this level, and at the transition to the midbrain became scattered through the reticular formation of the tegmentum. Bilateral constriction of the pupil resulted from stimulation of the optic tract, the pretectal area, and points near the line of separation between the central gray matter and the tegmentum at the level of the posterior commissure. (Four figures, discussion, seventeen references.)

Ralph W. Danielson.

Sargent, Percy. **A symposium on the diagnosis of intracranial new-growths.** (Opening paper.) Trans. Ophth. Soc. United Kingdam, 1931, v. 51, pp. 373-377.

The author, a general surgeon, considers headache, vomiting, and papilledema as symptoms of impending death, and discusses such tumors topographically and histologically.

Thomas D. Allen.

Sörensen, Einar. **Tumor of Rathke's pouch.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1932, pp. 8-11. In Hospitalstidende, Sept. 14, 1933.

A boy of thirteen years complained of vomiting and loss of vision, and had gained greatly in weight. Objective examination revealed adiposogenital dystrophy, with bilateral choked disc, bitemporal hemianopia, roentgenologic signs of increased intracranial pressure and suprasellar calcification, and increased carbohydrate tolerance. The tumor of the hypophysis, being extrasellar, very likely arose from rests of epithelial cells from Rathke's pouch. On account of its suprasellar development, this is the only tumor of the hypophysis which produces typical choked disc. D. L. Tilderquist.

13. EYEBALL AND ORBIT

Aspill, D. S. **Acute purulent endogenous endophthalmitis.** Arch. of Ophth., 1933, v. 9, May, pp. 820-825.

A boy of six years lost the right eye through panophthalmitis due to the hemolytic streptococcus. The tonsils were later removed and were found infected with the same organism.
M. H. Post.

Awerbach, M. I. **Blood tumors of the orbital cavity.** Ann. d'Ocul., 1933, v. 170, Oct., pp. 863-882.

The question is raised why a hemorrhage should take place in one orbit and not in the other. The author classifies the causes of orbital hemorrhages: (1) hemophilia, (2) scurvy, (3) general vasomotor troubles, (4) organic affections of the vascular walls, (5) elevation of arterial tension, (6) trauma. These causes are illustrated by case reports. H. Rommel Hildreth.

Fischer, F. P. **The mineral content of the eye.** Arch. f. Augenh., 1933, v. 107, Aug., p. 294.

Fischer determined in milligrams per c.c. the Cl, P, S, Na, K, Ca, and Mg content of the various structures of the eye. Each tissue of the eye has its own characteristic mineral structure. There seems to be a regulating mechanism that keeps this mineral content within narrow physiological limits.
Frederick C. Cordes.

Gamble, R. C. **Acute inflammation of the orbit in children.** Arch. of Ophth., 1933, v. 10, Oct., pp. 483-497.

The author's conclusions are drawn from twenty-five personal cases. Swelling of the lid in ethmoidal disturbance is, in his opinion, due to blocking of the drainage of the superior ophthalmic into the ethmoid veins. For more radical procedure, the author's method of approach is given in detail. The care of osteomyelitis of the maxilla in infants is emphasized. Radical antrum operation was resorted to in three cases.
M. H. Post.

Mans, R. **Microphthalmos with defective development of the lens. A further contribution to the essential formation of congenital corneal opacities.** Graefe's Arch., 1933, v. 130, p. 180.

A microphthalmic eye having shown from youth a corneal opacity was enucleated for cosmetic reasons. The fellow eye presented congenital coloboma of choroid and retina. Microscopic examination of the enucleated eye disclosed a noncentral defect of the posterior surface of the cornea accompanied by lack of endothelium and of Descemet's and Bowman's membranes at this place. A connective tissue tag extended posteriorly from this defect, formed a kind of pupillary plug in the iris, and then continued into a connective tissue mass lying behind the iris. On both sides of this mass lay rudiments of the lens within the lens capsule and united by two thicknesses of lens capsule, the latter imbedded in the posterior part of the connective tissue mass lying behind the iris. Of particular interest were retinal elements extending forward to the middle of the cornea. The author thinks these changes support Peter's theory that congenital corneal opacities are always due to defective separation of lens from cornea in early development.
H. D. Lamb.

Marine, D., and Rosen, S. H. **Exophthalmos in .thyroidectomized guinea pigs by thyrotropic substance of anterior pituitary and the mechanism in-**

volved. Proc. Soc. for Exper. Biol. and Med., 1933, v. 30, April, p. 901.

The authors have produced exophthalmos in young normal and thyroidectomized guinea pigs by using acetic acid extracts of anterior pituitary. This contains a thyrotropic hormone. Both thyroidectomy and thyroid insufficiency cause hypertrophy of the anterior pituitary, which in turn stimulates the centers in the midbrain controlling the sympathetic innervation producing exophthalmos.

M. E. Marcove.

Wilmer, W. H., and Pierce, H. F. **A retractor for the Krönlein operation.** Arch. of Ophth., 1933, v. 9, May, p. 828.

The retractor is so shaped as to protect the eyeball when sawing through the lateral wall of the orbit. The design was arrived at from measurements of plaster casts of normal adult orbits.

M. H. Post.

Wolff, Eugene. **Bilateral microphthalmos with cyst.** Trans. Ophth. Soc. United Kingdom, 1931, v. 51, pp. 308-323.

This very interesting pathological report is accompanied by two colored plates, seven photographs, a drawing, and four diagrams. They show clearly the author's modification of the generally accepted theories of cyst formation, namely: that the cysts usually arise from fluid collecting between the two layers of the secondary optic vesicle, much as it does in a retinal detachment; that in the region of the choroidal fissure they increase in size and reach the outside of the eye, where they develop to a variable size, lined by poorly differentiated rods and cones; the so-called "perverse retina".

Thomas D. Allen.

14. EYELIDS AND LACRIMAL APPARATUS

Ford, F. R. **Paroxysmal lacrimation during eating as a sequel of facial palsy (syndrome of crocodile tears).** Report of four cases with a possible interpretation and comparison with the auriculotemporal syndrome. Arch. of Neur, and Psych., 1933, v. 29, June, p. 1279.

In four cases lacrimation occurred whenever any sapid substance was taken into the mouth. In no case was eversion of the punctum or occlusion of the lacrimal duct present. The author suggests that some secretory fibers which formerly supplied the salivary glands had become misdirected during regeneration and had formed connections with the lacrimal gland. This anomaly is compared to the auriculotemporal syndrome from misdirection of some of the secretory fibers of the parotid gland after injuries to the auriculotemporal branch of the third division of the trigeminal nerve in the region of that gland. (Nine references and four figures.) Ralph W. Danielson.

Fox, Howard. **Nickel dermatitis from spectacle frames and wrist watch.** Jour. Amer. Med. Assoc., 1933, v. 101, Sept. 30, p. 1066.

Dermatitis of the temples, the postauricular region, and the left inner canthus were due to spectacles made of "white gold". A similar condition on the skin of the wrist followed the wearing of a nickel-plated wrist watch for the first time in the patient's life. Recovery was prompt after removal of the cause. George H. Stine.

Giani, P. **Dacryoadenitis (plasmoma) in a trachomatous patient.** Rassegna Ital. d'Ottal., 1933, v. 2, May-June, p. 485.

Giani removed one of the two much enlarged lacrimal glands from a woman with old trachoma. No constitutional cause could be found. Microscopically he observed lobules of various dimensions, delimited by connective tissue in which were accumulations of lymphocytes. Plasma cells and vessels were encountered between the masses of lymphocytes. No trachoma follicles were found, and the author therefore considers the case to be one of true plasmoma. Eugene M. Blake.

Gomez-Marquez. **Some remarks on a thousand operations of dacryocystorhinostomy.** Ann. d'Ocul., 1933, v. 170, Oct., pp. 850-862.

This is a review of the author's external procedure. He insists first on

adequate anesthesia and hemostasis. Anesthesia is obtained by blocking the nasal and infraorbital nerves with a four percent solution of novocain containing adrenalin. An infiltration is made near the canal. For making the bony window the trephine is recommended as least dangerous, easiest for the patient, and rapid in action as compared with other instruments. The mucous membranes should be sutured to facilitate prompt epithelialization and so to lessen the chance of secondary closure of the window.

H. Rommel Hildreth.

Henry, L. M. **Results of intranasal dacryocystorhinostomy.** Brit. Jour. Ophth., 1933, v. 17, Sept., p. 550.

This study is based upon 108 West operations done at the Royal Infirmary, Edinburgh, during the years 1915 to 1931. Of 77 cases asked to report, only 23 responded. Twenty-three cases (four after bilateral operation) were investigated. A perfect clinical result was obtained in 78 percent (compared with 73 percent in 1925). The fluorescein test may show apparent obstruction in cases with no epiphora and therefore is not of great practical importance. Sterilization of the conjunctival sac as regards streptococci and pneumococci was obtained in 82 percent.

D. F. Harbridge.

Kunz, Eberhard. **The clinical application of the Toti operation.** Zeit. f. Augenh., 1933, v. 81, Sept., p. 232.

The author describes the technique of the operation and summarizes the results attained at the Königsberg clinic. In 110 operations there were only five failures, and three of these seemed unsuitable before the operation was performed. Of the successful only five had troublesome or slight tearing, and in none was there pus formation. These satisfactory results are from the work of fifteen younger assistants and guests of the clinic. F. Herbert Haessler.

Neuman, J. **A case of naso-conjunctival fistula.** Klinika Oczna, 1933, v. 11, pt. 1, p. 11.

The patient, a woman aged forty years, had a 6 by 18 mm. fistulous passage extending from the inner angle of both eyelids into the nasal cavity. X-ray study revealed defects in the nasal and frontal processes of the maxillary bones. The fistula resulted from osteoperiostitis of probable tuberculous origin at the age of four years.

M. Beigelman.

Sanguinetti, C. **Foreign body in the lacrimal sac.** Rassegna Ital. d'Ottal., 1933, v. 2, May-June, p. 462.

Sanguinetti found a brown concretion in a sac which had been extirpated for chronic suppuration, in a woman of thirty-five years. When crushed, the foreign body proved to be a vegetable seed surrounded by a calcareous shell. The histology of the sac is described. (Six illustrations.)

Eugene M. Blake.

Smith, J. W. **Spontaneous dislocation of the lacrimal glands.** Jour. Amer. Med. Assoc., 1933, v. 101, Sept. 16, p. 905.

This presents a review of the literature, with report of a case, and the technique of surgical correction. Spontaneous dislocation of the lacrimal gland is a separate disease entity. It is seen commonly in Russian patients, but is probably of more frequent occurrence in this country than indicated in American textbooks and literature. Extirpation of dislocated lacrimal glands is hazardous and it is safer and simpler to return the gland into the lacrimal fossa. (Four photographs, discussion.)

George H. Stine.

15. TUMORS

Landau, Jacob. **Early diagnosis of malignant neoplasm in the region of the tear sac.** Zeit. f. Augenh., 1933, v. 81, Aug., p. 168.

A patient who complained of epiphora and a small induration in the region of the tear sac was found to have a malignant tumor involving the entire ethmoid. The roentgenogram, characterized by retention of the opaque mass above the level of an area of increased

bone formation, was a distinct aid in diagnosis. F. Herbert Haessler.

Rönne, Henning. **Melanosarcoma of the choroid.** Det oftalmologiske Selskab i Köbenhavn's forhandlinger, 1932, pp. 1-2. In Hospitalstidende, 1933, Sept. 14.

Eight cases of malignant tumor of the choroid, each presenting some valuable point in diagnosis, are reviewed. In two the diagnosis was determined by transillumination of the eyeball through Tenon's capsule. In a flat tumor of the choroid without shadow by transillumination, the true nature of the growth was suspected from the yellow color of the area. The yellow color is due to an exudate, rich in albuminous matter, characteristic of the tumor. In discussion the idea was presented that if a corresponding increase of albumin in the aqueous could be determined a valuable diagnostic method might be worked out. In two cases, hemorrhage in the vitreous was the first symptom.

D. L. Tilderquist.

Sédan, Jean. **The pain syndrome of tumors of the apex of the orbit.** Ann. d'Ocul., 1933, v. 170, Oct., pp. 846-850.

Although cutaneous nerve and motor nerve involvements are variable it is insisted that headaches are a constant feature of this condition. Complete corneal anesthesia is rare but diminished sensation is the rule.

H. Rommel Hildreth.

Simpson, J. H. **Orbital tumors, with case report.** Kentucky Med. Jour., 1933, v. 31, April, p. 177.

Two cases are reported, one of mixed malignant tumor of the lacrimal gland, the other of glioma of the retina. In the first case, exenteration of the orbit was done followed by a series of x-ray and radium treatments. In the latter case, the eye was removed for an "abscess" which later turned out to be orbital recurrence of the glioma. (Discussion.)

M. E. Marcove.

16. INJURIES

Biondo, M. **Ocular lesions caused by asphalt.** Rassegna Ital. d'Ottal., 1933, v. 2, May-June, p. 472.

Biomicroscopically and histologically, Biondo describes the results of contact of the eye with various asphaltic substances. He finds them to be irritative, both physically and chemically, but not caustic. The results are marginal blepharitis, conjunctivitis, desquamation of corneal epithelium, and sometimes corneal infiltration. The lesions recede completely in two weeks after the cause is removed.

Eugene M. Blake.

Carroll, Frank. **Frost bite of the cornea.** Amer. Jour. Ophth., 1933, v. 16, Nov., p. 994.

Fledelius, Magnus. **Traumatic iridodialysis.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1932, pp. 4-5. In Hospitalstidende, 1933, Sept. 14.

Eleven cases of traumatic iridodialysis without rupture of the globe are reported, all in young men. The lesions were uniformly located upward and temporally and all were associated with injuries to lens or choroid or both. Theories as to mechanism of occurrence are discussed at some length. The author favors Fraenkel's hypothesis, which assumed that subluxation of the lens is the primary lesion, the rebound against the iris causing rupture. Original experiments were made on calves' and pigs' eyes. Of twenty-one eyes used dialysis was obtained in five, in all of which previous subluxation of the lens had been accomplished by means of a needle pushed through the anterior chamber.

D. L. Tilderquist.

Perwög, Mathilde. **Detachment of the retina following traumatic hemorrhage of the choroid.** Arch. f. Augenh., 1933, v. 107, Aug., p. 514.

A case report.

Schmidt, H. **The technical development of Kuhnt's sliding flap.** Zeit. f. Augenh., 1933, v. 81, Sept., p. 239.

The author regards dissection of the conjunction without subconjunctival tissue as a sine qua non of the operation. He has caused to be constructed a special forceps which makes this step

easier. Instead of scissors he uses for dissection a knife sharpened at both edges and at the rounded tip and bent at an angle of 135° with the handle. The sutures are tied double so that they fill out the hole made by their passage through the tissue.

F. Herbert Haessler.

Spratt, C. N. **Foreign body in the eye sixty-seven years.** Arch. of Ophth., 1933, v. 9, Jan., pp. 102-103.

The eye was blind but free from irritation. The shadow was definite in the x-ray. After death a piece of metal, probably wrought iron, was found, resisting corrosion. W. H. Post.

17. SYSTEMIC DISEASES AND PARASITES

Doggart, J. H. **Herpes zoster ophthalmicus.** Brit. Jour. Ophth. 1933, v. 17, Sept., p. 513.

Doggart refers to two forms, the epidemic caused by acute infection involving part of the gasserian ganglion and the symptomatic associated with toxic, inflammatory, or neoplastic damage implicating the ganglion. The ocular complications are discussed under the headings of keratitis, iridocyclitis, ocular palsies, and optic neuritis. (Four illustrative cases, bibliography of thirty-nine references.) D. F. Harbridge.

Kohn, A. **Status of cardiovascular renal diseases.** Arch. of Ophth., 1933, v. 9, April, pp. 639-651.

This is a summary of the present attitude toward the problems of cardiac, vascular, and renal disease. General principles of treatment are outlined.

M. H. Post.

Rohrschneider, W. **Frequency and forms of ocular affection in active tuberculosis of other organs.** Zeit. f. Augenh., 1933, v. 81, Sept., p. 197.

Among 42,191 tuberculous patients reported by many observers, thirty-eight had ocular lesions, roughly one in one thousand. In 181 with hematogenous metastasis seventeen eyes were involved, and other observers found ocular involvement in from five to seven percent of surgical tuberculosis. No relationship could be traced with location of the infection in certain other organs of the body, though the number of cases of joint tuberculosis associated with ocular tuberculosis is relatively great. In eleven further cases of tuberculous eye disease, observed primarily in the eye clinic, the patients were found to have active tuberculous processes elsewhere, usually in an early stage. In three of these there was a transient recurrent iritis of the type usually called acute rheumatic, in two there was vitreous hemorrhage, and in one patient there was a conglomerate tubercle of the iris. The patient died soon after of general miliary tuberculosis. In others there was chronic iridocyclitis. The right eye was involved six times, the left five. F. Herbert Haessler.

ter Braak, J. W. G., and van Herwaarden, A. **Ophthalmo-encephalomyelitis.** Klin. M. f. Augenh., 1933, v. 91, Sept., p. 316.

Under this name six cases are described. Essential distinction between disseminated encephalo-myelitis and subacute multiple sclerosis is considered impossible at present. Three kinds of ophthalmologic change were observed: perivasculitic, diffuse retinitic, choroiditic of an unusual type without evidence of certain etiology. It is assumed that the virus of multiple sclerosis may also produce inflammatory reactions in other organs than the central nervous system, seldom or only slightly giving rise to clinical symptoms, whereas disintegration of myelin and proliferation of glia probably as secondary reactions occur solely in the central nervous system, causing the frequency of neurological signs.

C. Zimmermann.

Viallefont, H. **Ocular manifestations of the posterior cervical sympathetic syndrome.** Arch. d'Opht., 1933, v. 50, Sept., p. 630.

The syndrome of the posterior cervical sympathetic is due to excitation of the vertebral nerve causing disturbances of circulation in the region of the

nuclei and affecting particularly the fifth and eighth nerves, with symptoms of headache, vertigo, tinnitus, pain in the eyes and ears, vasomotor disturbances of the face, pharyngeal and laryngeal paresthesia, and disturbances of deglutition and phonation. Hypesthesia of the cornea with persistent recurrent small ulcers confined to the palpebral fissure may occur in a type with chronic cervical arthritis. M. F. Weymann.

Worms, G. **The tonsils and the visual apparatus.** Bull. Soc. Franç. d'Opht., 1932, 45th year, p. 447.

Worms reviews the literature on focal infection and reports four cases of intraocular disease which could apparently be traced to tonsil infection. The first case was one of retinal hemorrhage. Removal of the tonsils produced a violent temporary flareup but a good end result was obtained. The second case was one of recurrent uveitis which did not heal definitely until the tonsils were removed. The third and fourth cases had retrobulbar neuritis; in one of the cases healing followed tonsillectomy. The author believes that the tonsils should be examined for infection in all cases of uveal disease.

Phillips Thygeson.

Yudkin, A. M. **Ocular disturbances produced in experimental animals by dietary changes: clinical implications.** Jour. Amer. Med. Assoc., 1933, v. 101, Sept. 16, p. 921.

A large percentage of the animals showed definite types of ophthalmic lesion. On a diet lacking vitamin A the secretion of the paraocular glands is altered so that the epithelium of the conjunctiva and cornea is changed. There also seems to be a disturbance of the pigment and neuroepithelial layers of the retina, for the animals have poor dark adaptation. Administration of cod-liver oil may benefit related retinal diseases. When vitamin A is added to the diet, persons with toxic amblyopia due to alcohol and tobacco have a shorter period of convalescence, and photophobia due to phlyctenular keratoconjunctivitis is alleviated much sooner, than when local medication alone is used. No definite connection was detected between dietary disturbances and so-called senile cataract, with the exception of the changes that appear in persons with diabetes. (Discussion.)

George H. Stine.

18. HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Adrogue, A., Courtis, B., and Sena, J. A. **Actual state of the treatment of myopia. Can myopia be corrected without glasses?** Arch. de Oft. de Buenos Aires, 1933, v. 8, March, pp. 104-111.

The authors call attention to the misleading reports of the so-called "School of eyesight without glasses" (Bates method). The propagandists of this school use commercial means to attract the public, but are not able to prove their contention by publication of sound statistics. R. Castroviejo.

Blaydes, J. E. **The blind and visually handicapped in West Virginia.** West Virginia Med. Jour., 1933, v. 29, July, p. 293.

After stating that West Virginia is far behind most states in caring for its blind and visually handicapped children, the author makes a plea for creation by the state legislature of a commission to deal with the problem.

M. E. Marcove.

Bronne, Jean. **The present situation of the blind in France.** Outlook for the Blind, 1933, v. 27, June, p. 102.

France was one of the first to organize institutions for the welfare of the blind. Blind children receive general instruction and vocational training in thirty special schools, most of which are privately supported. France offers the greater number of opportunities in the field of music for the blind. The aged blind are for the most part taken care of by a relief act which supplies either monthly payments of money or maintenance in an institution. The blind themselves are organized into powerful organizations for legislative reform and mutual assistance. M. E. Marcove.

Crisp, W. H. **Standards and licensure in ophthalmology.** Jour. Amer. Med. Assoc., 1933, v. 101, pp. 849-851.

The author urges a steady advance in standards for special practice. Reference is made to requirements in foreign countries. A diploma or certificate as to qualification in ophthalmology should be based upon thorough training in all branches of ophthalmic science, and especially in those branches which have importance for the greatest number of patients. The provision of thoroughly systematized courses of instruction should be stimulated. Ultimately, public interest is likely to require special license for special practice.

Jackson, Edward. **The history of cataract operations.** Amer. Jour. Ophth., 1933, v. 16, Sept., pp. 767-772.

Munro, David. **Vision in sport and games.** Trans. Ophth. Soc. United Kingdom, 1931, v. 51, pp. 323-333.

The author considers the subject under the following headings: (1) relation of visual to other factors involved, e.g., muscular coordination; (2) various types of visual judgment to be made in different sports and games; (3) relative importance of perceptual factors involved.

In regard to flying hyperopia is the most serious refractive error, as the act of accommodation causes pilots to underestimate distance so that they land badly. Of 124 old and tried fliers 123 were orthophoric, and 93 percent had 6/6 vision. Of the 72 pupil pilots who were bad landers 96 percent had 6/6 acuity, but all had muscle imbalance. Training with the amblyoscope and so on has helped some to become good landers. Thomas D. Allen.

Paterson, J. R. **Some notes on eye conditions in compensation cases in Scottish miners.** Trans. Ophth. Soc. United Kingdom, 1931, v. 51, pp. 341-352.

This is a study of five hundred consecutive compensation eye cases. Nearly half were hypopyon ulcer, nearly a fourth penetrating injury, and the balance were divided among about twenty-five other conditions. The author discusses these and the difficulties in litigation in Scotland.

Thomas D. Allen.

Sachs, Bernard. **The intimate relation between ophthalmology and neurology. Some reminiscences.** Arch. of Ophth., 1933, v. 10, Oct., pp. 433-437.

The author pleads for a continued close relationship between neurology, ophthalmology, otology, and general medicine. M. H. Post.

Schoute, G. J. **The artificial eye in Spanish literature.** Arch. de. Oft. Hisp.-Amer., 1933, v. 33, Aug., p. 514.

A study of Spanish literature shows not only that Spain was ahead of other countries in the use of spectacles and sun glasses, but that artificial silver eyes were already in common use in Spain in 1617, when their use was still rare in other countries.

M. Davidson.

19. ANATOMY AND EMBRYOLOGY

Nicolati, A. **Finer anatomy of the iridocorneal angle.** Rassegna Ital. d'-Ottal., 1933, v. 2, May-June, p. 379.

Nicolati studied histologically the iridocorneal angle in fetal eyes of all stages and in adult eyes. He considers especially the relationship between Descemet's membrane and the corneoscleral trabeculae and concludes that the latter are not the product of a splitting up of the former. There is a layer of cementlike substance which clearly separates the internal limiting surface from the trabeculae. The latter structures are inserted upon the elements of the corneal parenchyma. The author also records in detail the behavior of the elastic fibers and their relation to the trabeculae and Schlemm's canal. (Ten illustrations.)

Eugene M. Blake.

Shropshire, Ralph. **Eye of the trout.** Arch. of Ophth., 1933, v. 10, Oct., pp. 498-507.

The trout has a flat cornea, an apparently fixed pupil, an almost spherical lens, and a falciform process. The iris almost entirely lacks true muscle

structure. The sclera is practically cartilaginous. The falciform process is a fold of the choroid arising near the optic nerve and having its anterior portion in contact with the lens. This is believed to displace mechanically the lens by contraction and expansion in the act of accommodation.

M. H. Post.

NEWS ITEMS

News items in this issue were received from Dr. Samuel Horton Brown, Philadelphia. News items should reach Dr. Melville Black, 424 Metropolitan Building, Denver, by the twelfth of the month.

Deaths

Dr. Ernest Edmund Maddox, London, ophthalmologist, known for his work in the correction of squint, died, November 10, aged seventy-three years.

Miscellaneous

The University of Southern California has discontinued the School of Optometry.

All eyelash dyes containing aniline or coal tar products are now prohibited from being offered for sale on the San Francisco market. The Health Commissioner of New York City has taken similar action.

Portraits of the late Dr. Joseph S. Lichtenberg, Kansas City, Mo., were unveiled at St. Joseph and Menorah Hospitals, October 9. Dr. Lichtenberg had been a member of the staff of St. Joseph Hospital for thirty-six years, and of Menorah Hospital since its founding.

Dr. John Elmer Weeks' eightieth birthday, reached on the ninth of August, was celebrated by his Oregon friends in a complimentary dinner held at the Arlington Club, Portland, Oregon, on December 5. The dinner was confined to Dr. Weeks' more intimate associates in various branches of the medical profession. By a fortunate circumstance Dr. Hugh Cabot, an old friend of Dr. Weeks, was able to attend, and he made some very happy remarks on Dr. Weeks' career. A résumé of his professional life was given by Dr. Ralph Davis, and Dr. Ralph Fenton delivered an eloquent eulogy. Dr. Frederick A. Kiehle presided and read the large number of letters and telegrams which had been received from individuals and from various eastern organizations through their secretaries. Dr. Weeks expressed his appreciation with simplicity and much feeling. The occasion was characterized by a delightful unanimity and spontaneity of expression.

An unusually comprehensive didactic course of instruction in Ophthalmology is to be offered during the year 1934 starting January 1 to internes and residents in Ophthalmology in the various hospitals in Chicago. It is an outgrowth and amplification of the course previously known as the city-wide course.

Two hundred hours of didactic instruction will be given by fifty-three instructors from the various universities and hospitals. These lectures will be divided evenly between the fundamental and the clinical branches, but they will in no wise be a substitute for actual clinical work.

Dr. Victor C. Rambo, M.D., F.A.C.S., is working at the Mungeli Area Christian Hospital and Dispensaries and the Victoria Leper Asylum at Mungeli, India. He has written to the American College of Surgeons asking whether a usable ophthalmometer or other instruments or equipment for use in work on the eye are available for their work at Mungeli. He draws attention to the fact that each year there are ophthalmologists who, because of retirement or other reason, find themselves with such instruments that they do not expect to use. He sends an appeal to his colleagues in America to send such articles to Mr. William M. Danner, General Secretary of the American Mission to Lepers, 156 Fifth Avenue, New York, who will send these things to him.

Societies

The Iowa Academy of Ophthalmology and Otolaryngology held an all day meeting in Des Moines, December 5, which was devoted to the presentation of case histories and demonstrations.

The Western Pennsylvania Eye, Ear, Nose and Throat Society was organized at a meeting in Indiana, October 19. Drs. George M. Coates, Philadelphia, and George H. Shuman, Pittsburgh, addressed the meeting on sinus disease and slit lamp microscopy, respectively.

At the last meeting of the Section on Ophthalmology of the College of Physicians, Philadelphia, Dr. Leighton F. Appleman in the chair, the following program was presented:

Dr. Warren S. Reese: Exhibition of (1) Case of polycoria, (2) Case of drusen of the fundus.

Dr. Charles R. Heed: Epibulbar sarcoma. Exhibition of case.

Dr. W. E. Fry (by invitation): Tuberculosis of the choroid in a monkey.

Drs. C. E. G. Shannon and Leo F. McAndrews: A diabetic and tobacco amblyopia. Case report.

Dr. Luther C. Peter: The treatment of retinal detachment by the Walker method of electro-coagulation. Exhibition of cases.